JAPANESE [JP,10-164650,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

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CLAIMS

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[Claim(s)]
[Claim 1] In the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area moves to other adjoining communication link service areas The transmitting phase contrast to which the mobile station equipment which is a candidate for migration exists between the transmitting phase of the transmission frame alignment signal transmitted from the base station equipment which has a communication channel actually, and the transmitting phase of the transmission frame alignment signal transmitted from the base station equipment which newly plans a setup of a communication channel is detected. The 1st processing which notifies the phase contrast information concerned to the base station equipment which corresponds through the communication channel which exists actually, The base station equipment which received the above-mentioned notice notifies the above-mentioned phase contrast information to the base station equipment which newly plans a setup of a communication channel. The communication channel change control approach characterized by having the 2nd processing which amends the phase of the transmit data of the schedule transmitted from the above-mentioned base station equipment to the above-mentioned mobile station equipment.
[Claim 2] In the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area moves to other adjoining communication link service areas While holding two or more base station equipments which set up a communication channel between mobile station equipment, and send and receive commo data The migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more above-mentioned base station equipments and the above-mentioned mobile station equipment When carrying out the multiple address of the same commo data to two or more mobile station equipments concerning the change candidate of a communication channel, The 3rd processing which disassembles into the data of a short unit time interval the commo data by which the multiple address is carried out as compared with frame length, and adds the identification code of a meaning to each of the data concerned, The base station equipment which has a communication channel actually the identification code corresponding to the initial data of degree frame period determined in consideration of the base station equipment which is newly due to set up a communication channel The communication channel change control approach characterized by having the 4th processing beforehand notified to the base station equipment which is newly due to set up a communication channel.
[Claim 3] The communication channel change control approach characterized by having the 1st processing according to claim 1, the 2nd processing according to claim 1, the 3rd processing according to claim 2, and the 4th processing according to claim 2 in the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area moves to other adjoining communication link service areas.
[Claim 4] In the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area moves to other adjoining communication link service areas While holding two or more base station equipments which set

up a communication channel between mobile station equipment, and send and receive commo data The migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more above-mentioned base station equipments and the above-mentioned mobile station equipment From each of two or more base station equipments involved in the change concerned at the time of the change of a communication channel When each equipment inputs the received data which were received and were recovered from mobile station equipment, The communication channel change control approach characterized by having the 5th processing which compounds alternatively the received data into which each base station equipment is inputted from two or more above-mentioned base station equipments based on the reliability information given to the received data concerned.

[Claim 5] While holding two or more base station equipments which set up a communication channel between mobile station equipment, and send and receive commo data In the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more above-mentioned base station equipments and the above-mentioned mobile station equipment The transmitting phase contrast to which the mobile station equipment which is a candidate for migration exists between the base station equipment which has a communication channel actually, and the base station equipment which plans a setup of a new communication channel is detected. Migration communications control station equipment characterized by having a notice means of transmitting phase contrast to notify the phase contrast information notified to the base station equipment which corresponds through the communication channel which exists actually to the base station equipment which newly plans a setup of a communication channel.

[Claim 6] While holding two or more base station equipments which set up a communication channel between mobile station equipment, and send and receive commo data In the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more above-mentioned base station equipments and the above-mentioned mobile station equipment An identification code addition means to disassemble into the data of a short unit time interval the commo data transmitted to the above-mentioned mobile station equipment as compared with frame length, and to add the identification code of a meaning to each of the data concerned, Migration communications control station equipment characterized by having the multiple address means which carries out the multiple address of the same commo data to which the above-mentioned identification code was given to two or more mobile station equipments concerning the change candidate of the above-mentioned communication channel.

[Claim 7] Migration communications control station equipment according to claim 5 or 6 characterized by having a clock supply means to supply the same clock which directs timing of operation, to two or more above-mentioned base station equipments held.

[Claim 8] While holding two or more base station equipments which send and receive commo data through the communication channel set up between mobile station equipment In the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more above-mentioned base station equipments and the above-mentioned mobile station equipment Migration communications control station equipment characterized by having the notice means of transmitting phase contrast according to claim 5, an identification code addition means according to claim 6, and a multiple address means according to claim 6.

[Claim 9] While holding two or more base station equipments which set up a communication channel between mobile station equipment, and send and receive commo data In the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more above-mentioned base station equipments and the above-mentioned mobile station equipment From each of two or more base station equipments involved in the change of the communication channel concerned at the time of the change of a communication channel The migration communication controller characterized by having a selection composition means to compound alternatively the received data into which

each base station equipment is inputted from two or more base station equipments concerned based on the reliability information given to the received data concerned when each equipment inputs the received data which were received and were recovered from mobile station equipment.

[Claim 10] In the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual which was held in migration communications control station equipment with other base station equipments, and was set up between 1 or two or more mobile station equipment of each, respectively A synchronizing signal transmitting means to transmit to the mobile station equipment which will plan a setup of a communication channel mobile station equipment or from now on which has a communication channel for the transmission frame period signal formed based on the internal clock actually, It follows on the mobile station equipment located in the communication link service area of self-equipment moving to the communication link service area which other adjoining base station equipments offer. When the transmitting phase contrast which exists from the mobile station equipment concerning the migration concerned between the transmission frame alignment signal received from other base station equipments which newly plan a setup of a communication channel, and the transmission frame alignment signal received from self-equipment has been notified as phase contrast information, Base station equipment characterized by having a notice means of transmitting phase contrast to notify the phase contrast information concerned, to other adjoining base station equipments.

[Claim 11] In the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual which was held in migration communications control station equipment with other base station equipments, and was set up between 1 or two or more mobile station equipment of each, respectively From other base station equipments When the transmitting phase contrast which exists between the transmission frame period signals of other base station equipments with which a communication channel is actually set up with the transmission frame period signal of the self-equipment to the mobile station equipment which will newly plan a setup of a communication channel from now on, and the communication link is performed is notified as phase contrast information, Base station equipment characterized by having a transmission-frame phase correction means to amend the phase of the transmission frame alignment signal of the newly set-up communication channel, based on the phase contrast information concerned.

[Claim 12] In the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual which was held in migration communications control station equipment with other base station equipments, and was set up between 1 or two or more mobile station equipment of each, respectively When there is the multiple address of the same commo data addressed to the change candidate of a communication channel from the above-mentioned migration CCE, In having a communication channel between the mobile station equipment which applies self-equipment to the change of the communication channel concerned actually Base station equipment characterized by having a notice means of an identification code to notify beforehand the identification code corresponding to the initial data of degree frame period determined in consideration of the base station equipment which newly sets up a communication channel to other base station equipments which newly plan a setup of a communication channel.

[Claim 13] In the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual which was held in migration communications control station equipment with other base station equipments, and was set up between 1 or two or more mobile station equipment of each, respectively Self-equipment from other base station equipments which have a communication channel actually between the mobile station equipment which will change a communication channel from now on When the notice of the identification code by which the equipment concerned is given to the initial data of degree frame is received, Base station equipment characterized by having a transmission-frame generation means to discriminate the commo data corresponding to the identification code concerned from the commo data by which the multiple address was carried out from the above-

mentioned migration CCE, and to generate the following transmission frame by making the commo data concerned into initial data.
[Claim 14] In the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual which was held in migration communications control station equipment with other base station equipments, and was set up between 1 or two or more mobile station equipment of each, respectively Base station equipment characterized by having a synchronizing signal transmitting means according to claim 10, the notice means of transmitting phase contrast according to claim 10, a transmission-frame phase correction means according to claim 11, a notice means of an identification code according to claim 12, and a transmission-frame generation means according to claim 13.
[Claim 15] In the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual which was held in migration communications control station equipment with other base station equipments, and was set up between 1 or two or more mobile station equipment of each, respectively An error detection means to acquire the reliability of the received data which were received and were recovered from mobile station equipment based on an error detection result at the time of the change of a communication channel, Base station equipment characterized by having a reliability information addition means to send out to the migration communications control station equipment with which it adds to the above-mentioned received data, and self-equipment is held by making into reliability information reliability acquired by the above-mentioned error detection means.
[Claim 16] In the mobile station equipment which sends and receives commo data through a communication channel with the base station equipment which has jurisdiction [ service area / in which self-equipment is located / communication link ] A phase contrast detection means to detect the transmitting phase contrast which exists between the transmitting phase of the transmission frame alignment signal received from the base station equipment which has a communication channel actually, and the transmitting phase of the transmission frame alignment signal received from the base station equipment which newly plans a setup of a communication channel, Mobile station equipment characterized by having a notice means of transmitting phase contrast to notify to the base station equipment which has a communication channel actually between self-equipment by making into phase contrast information transmitting phase contrast detected by the above-mentioned phase contrast detection means.
[Claim 17] The mobile station equipment according to claim 16 characterized by to have an input-signal recovery means carries out the synthetic reception of the input signal received from the base station equipment which has a communication channel actually in the mobile station equipment which sends and receives commo data through a communication channel with the base station equipment which has jurisdiction [ service area / in which self-equipment is located / communication link ], and the input signal which are received from the base station equipment with which a setup of a communication channel is newly planned, and get over.
[Claim 18] The base station equipment according to claim 16 or 17 characterized by to have a notice means of a receive state notify to the base station equipment which has a communication channel actually between self-equipment by making into receive state information the receive state over each base station equipment measured by receive state measurement means measure a receive state about each input signal received from two or more base station equipments containing the base station equipment which has a communication channel actually, and the above-mentioned receive state measurement means.
[Claim 19] At least one migration communications control station equipment according to claim 5 to 9 connected to the communication network, Migration communication system characterized by having two or more base station equipments according to claim 10 to 15 connected to the above-mentioned migration communications control station equipment, and two or more mobile station equipments according to claim 16 to 18 connected to at least one of two or more above-mentioned base station equipments.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention can be applied to personal communication system (it is called "PCS" Personal Communication Services and the following) or the migration communication system using a code-division-multiple-access (it is called "CDMA" Code Division Multi Access and the following) method as an access method like digital cellular one, concerning migration communication system. Moreover, this invention relates to the mobile station equipment as each component which constitutes this migration communication system, base station equipment, and the migration communications control station (it is called "MCC" Mobile Communication Control Center and the following) equipment of a high order. Furthermore, this invention relates to the communication channel change control approach used in this migration communication system.
[0002]
[Description of the Prior Art] There is for example, the following reference as conventional reference which carried out CDMA communication system ****** description. reference: "Mobile Station-Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular System, TIA/EIA/IS-95, July 1993, and U.S.A." — the national form method about the wireless interface which connects to this reference between the mobile station which builds CDMA communication system, and a base station is described.
[0003] In this conventional CDMA communication system, it has the composition of transmitting information with the transmission speed which specified the transmission line which connects between MCC and each base station by the Synchronous Digital hierarchy (it is called "SDH" Synchronous Digital Hierarchy and the following), and was specified in SDH. In addition, MCC is transmitting User Information (speech information and the information on computer data and others are included) and control information about two or more mobile stations which exist in the communication link service area of each base station by carrying out Time Division Multiplexing of the transmission line concerned.
[0004] Moreover, in this conventional CDMA communication system, all mobile stations, the base stations, and MCC hold the receiver of a global positioning system (henceforth "GPS"), and after each equipment which constitutes the communication system concerned has synchronized mutually with time of day absolutely, it is operating. For this reason, also when changing to other base stations from a certain base station from a base station to a mobile station which gets down and is communicating a link, it becomes possible to transmit the same information in the condition of having synchronized, from two or more base stations, and the maximum ratio composition diversity reception has come turn on a mobile station side. Thereby, it gets down and a break appears in a signal at the time of a link change. This is called software handover.
[0005] Moreover, by carrying out a software handover and using cel diversity by the CDMA communication link which performs transmitted power control, for interference reduction of a communication link of other users, reduction of transmitted power is enabled, the number of the mobile stations which can connect per one base station can be increased, and the communication link effectiveness of the whole system can be improved now.

[0006]
[Problem(s) to be Solved by the Invention] However, it sets to equipment conventionally based on the standard method described by the above-mentioned reference. It compares with the time amount taken for the information transmitted to time of day with MCC as conditions searched for in order to carry out a software handover to already reach the base station under communication link between mobile stations. The time amount taken for the same information by which multicast transmission was carried out from MCC to the base station which is newly going to join the communication link with a mobile station to arrive had to become short.
[0007] In case this transmits the information which continues like voice, it is for having to hold the link prepared between the already connected base stations. That is, supposing information has not reached the base station of the side which the link formed in a mobile station must transmit information from the base station which newly connects synchronizing with the link currently held actually, and must take a synchronization, it is because it becomes impossible to carry out a software handover. Therefore, when this software handover is unrealizable, the change-over by which an information flow is cut in pieces at the mobile station side which receives continuation data, such as voice, will be carried out. This is called hard handover below as compared with the software handover of information sequence non-hits.
[0008] The probability for the conditions of this software handover to no longer be fulfilled will become high when dispersion is in the distance of the transmission line from MCC to each base station. Then, although the technique of easing the conditions of a software handover by notifying the head of the transmission unit of a wireless interface to each base station from MCC, and inserting delay of fixed time amount for a buffer in each base station was taken, there was no guarantee by which a software handover is surely carried out. Moreover, in order to realize a system synchronization, a mobile station's having to hold a GPS receiver had been restrained when a terminal was constituted at a low price.
[0009]
[Means for Solving the Problem] In order to solve this technical problem, in each invention, it is characterized by having the following processings or a means, respectively.
[0010] (A-1) In the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area moves to other adjoining communication link service areas in the 1st invention first, it is characterized by having the following procedure.
[0011] Namely, (1) The mobile station equipment which is a candidate for migration The transmitting phase contrast which exists between the transmitting phase of the transmission frame alignment signal transmitted from the base station equipment which has a communication channel actually, and the transmitting phase of the transmission frame alignment signal transmitted from the base station equipment which newly plans a setup of a communication channel is detected. The phase contrast information concerned The 1st processing notified to the base station equipment which corresponds through the communication channel which exists actually, (2) The base station equipment which received the notice notifies phase contrast information to the base station equipment which newly plans a setup of a communication channel, and is characterized by having the 2nd processing which amends the phase of the transmit data of the schedule transmitted from base station equipment to mobile station equipment.
[0012] (A-2) Set to the 1st invention in this way. The transmission frame alignment signal actually transmitted between mobile station equipment from the base station equipment which has a communication channel, By having considered as the configuration which amends the transmitting phase contrast which exists between the transmission frame alignment signals transmitted from the base station equipment which newly plans a setup of a communication channel based on the phase contrast information to which it is notified from mobile station equipment Even if it is the case where it is operating with the clock in which each base station equipment carried out mutually-independent, the phase simulation of the transmission frame sent out from both base station equipment at the time of a change can be guaranteed. This becomes possible to abolish the need of carrying a GPS receiver in each equipment which

constitutes migration communication system.
[0013] (B-1) Moreover, in the 2nd invention, it is characterized by having the following procedure in the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area moves to other adjoining communication link service areas.
[0014] Namely, (1) While holding two or more base station equipments which set up a communication channel between mobile station equipment, and send and receive commo data The migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more base station equipments and mobile station equipment When carrying out the multiple address of the same commo data to two or more mobile station equipments concerning the change candidate of a communication channel, The 3rd processing which disassembles into the data of a short unit time interval the commo data by which the multiple address is carried out as compared with frame length, and adds the identification code of a meaning to each of the data concerned, (2) The base station equipment which has a communication channel actually the identification code corresponding to the initial data of degree frame period determined in consideration of the base station equipment which is newly due to set up a communication channel It is characterized by having the 4th processing beforehand notified to the base station equipment which is newly due to set up a communication channel.
[0015] (B-2) The identity of the information on the transmission frame by which simultaneous transmission is carried out at the time of a change from the base station equipment which applies the base station equipment which actually transmits commo data to the change concerned in the 2nd invention in this way by having considered the identification code corresponding to the initial data of degree frame period determined in consideration of other base station equipments concerning a change as the configuration which notifies to the base station equipment concerning the change concerned beforehand can be guaranteed. Thereby, a positive software handover can be guaranteed. Moreover, since the time delay needed in order to make initial data in agreement can be set up finely at the identification code which expresses a short unit time interval as compared with frame length, it can perform software handover processing by necessary minimum delay.
[0016] (C) In the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area furthermore moves to other adjoining communication link service areas in the 3rd invention, it is characterized by having the following procedure.
[0017] Namely, (1) The 1st processing according to claim 1 and (2) 2nd processing according to claim 1 (3) The 3rd processing according to claim 2 and (4) It is characterized by having the 4th processing according to claim 2.
[0018] thus, the 3rd invention — setting — the communication channel change control approach — the above (1) - (4) by having prepared each processing, each base station equipment is mutually-independent — even if it is the case where it is operating with the clock the bottom, the phase simulation of the transmission frame sent out from both base station equipment at the time of a change can be guaranteed, and, moreover, fear of failure of a software handover can also be abolished.
[0019] (D-1) In the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area furthermore moves to other adjoining communication link service areas in the 4th invention, it is characterized by having the following procedure.
[0020] Namely, while holding two or more base station equipments which set up a communication channel between mobile station equipment, and send and receive commo data The migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more base station equipments and mobile station equipment From each of two or more base station equipments involved in the change concerned at the time of the change of a communication channel When each equipment inputs the received data which were received and were recovered from mobile station

equipment, it is characterized by having the 5th processing which compounds alternatively the received data into which each base station equipment is inputted from two or more base station equipments based on the reliability information given to the received data concerned.
[0021] (D-2) The dependability of the received data received on the occasion of a software handover can be raised by having considered as the configuration in which it had been received by each of two or more base station equipments from mobile station equipment, and it compounds commo data alternatively in the 4th invention in this way based on the reliability information.
[0022] (E-1) Moreover, in the 5th invention, while holding two or more base station equipments which set up a communication channel between mobile station equipment, and send and receive commo data, in the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more base station equipments and mobile station equipment, it is characterized by having the following means.
[0023] That is, it is characterized by to have a notice means of transmitting phase contrast notify the phase-contrast information which notified to the base station equipment with which the mobile station equipment which is a candidate for migration corresponds through the communication channel which detects the transmitting phase contrast which exists between the base station equipment which has a communication channel actually, and the base station equipment which plans a setup of a new communication channel, and exists actually to the base station equipment which newly plans a setup of a communication channel.
[0024] (E-2) Set to the 5th invention in this way. By having notified the transmitting phase contrast which exists between the base station equipment concerning the change concerned, before forming the notice means of transmitting phase contrast in the migration CCE which carries out supervisory control of the change of a communication channel and actually performing the change of a communication channel Also when these base station equipment is operating with the clock which became independent, respectively, it becomes possible to make in agreement the transmitting phase of the commo data transmitted from each base station equipment.
[0025] (F-1) While holding two or more base station equipments set up a communication channel between mobile station equipment, and furthermore send and receive commo data in the 6th invention, in the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more base station equipments and mobile station equipment, it is characterized by having the following means.
[0026] Namely, (1) An identification code addition means to disassemble into the data of a short unit time interval the commo data transmitted to mobile station equipment as compared with frame length, and to add the identification code of a meaning to each of the data concerned, and (2) It is characterized by having the multiple address means which carries out the multiple address of the same commo data to which the identification code was given to two or more mobile station equipments concerning the change candidate of a communication channel.
[0027] (F-2) Set to the 6th invention in this way. An identification code addition means and a multiple address means are formed in the migration communication controller which carries out supervisory control of the change of a communication channel. By having been made to carry out the multiple address to the base station equipment which disassembles commo data into a short unit time interval as compared with frame length, gives the identification code of a meaning to this, and is applied to the change of a communication channel It becomes possible to guarantee the identity of the transmission frame generated in two or more base station equipments on the basis of the identification code concerned. Moreover, the processing is realizable by the minimum time delay. Thereby, a positive software handover is guaranteed.
[0028] (G) While holding two or more base station equipments furthermore send and receive commo data in the 7th invention through the communication channel set up between mobile station equipment, in the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more

base station equipments and mobile station equipment, it is characterized by having the following means.

[0029] Namely, (1) The notice means of transmitting phase contrast according to claim 5, and (2) An identification code addition means according to claim 6 and (3) It is characterized by having a multiple address means according to claim 6.

[0030] Thus, it is the above (1) to the migration communication controller which carries out supervisory control of the change of a communication channel in the 7th invention. - (3) By having established each shown means Even if it is the case where it is operating with the clock in which each base station equipment carried out mutually-independent, the phase simulation of the transmission frame sent out from both base station equipment at the time of a change can be guaranteed, and, moreover, fear of failure of a software handover can also be abolished.

[0031] (H-1) While holding two or more base station equipments set up a communication channel between mobile station equipment, and furthermore send and receive commo data in the 8th invention, in the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more above-mentioned-base station equipments and the above-mentioned mobile station equipment, it is characterized by having the following means.

[0032] That is, when the received data which each equipment received and recovered from each of two or more base station equipments involved in the change of the communication channel concerned from mobile station equipment at the time of the change of a communication channel are inputted, it is characterized by to have a selection composition means compound alternatively the received data into which each base station equipment is inputted from two or more base station equipments concerned based on the reliability information given to the received data concerned.

[0033] (H-2) The dependability of the received data received on the occasion of a software handover can be raised by forming a selection composition means in the migration CCE which carries out supervisory control of the change of a communication channel in the 8th invention in this way, compounding alternatively not only the received data received from the base station equipment which has a communication channel actually but the received data received in other base station equipments, and using them as uphill received data.

[0034] (I-1) In the 9th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means again in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.

[0035] Namely, (1) A synchronizing signal transmitting means to transmit to the mobile station equipment which will plan a setup of a communication channel mobile station equipment or from now on which has a communication channel for the transmission frame period signal formed based on the internal clock actually, (2) It follows on the mobile station equipment located in the communication link service area of self-equipment moving to the communication link service area which other adjoining base station equipments offer. When the transmitting phase contrast which exists from the mobile station equipment concerning the migration concerned between the transmission frame alignment signal received from other base station equipments which newly plan a setup of a communication channel, and the transmission frame alignment signal received from self-equipment has been notified as phase contrast information, It is characterized by having a notice means of transmitting phase contrast to notify the phase contrast information concerned, to other adjoining base station equipments.

[0036] (I-2) It sets to the 9th invention in this way. By having formed the synchronizing signal transmitting means and the notice means of transmitting phase contrast in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively While being able to recognize the transmitting phase contrast which exists between the base station equipment applied to the change of a communication channel including self-equipment through mobile station equipment, it becomes possible to

abolish the transmitting phase contrast between oneself-and-others equipment by notice to the base station equipment of another side.
[0037] (J-1) Moreover, in the 10th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.
[0038] namely, from other base station equipments When the transmitting phase contrast which exists between the transmission frame period signals of other base station equipments with which a communication channel is actually set up with the transmission frame period signal of the self-equipment to the mobile station equipment which will newly plan a setup of a communication channel from now on, and the communication link is performed is notified as phase contrast information, It is characterized by having a transmission-frame phase correction means to amend the phase of the transmission frame alignment signal of the newly set-up communication channel, based on the phase contrast information concerned.
[0039] (J-2) The synchronization with other base station equipments concerning a software handover is establishable by forming a transmission-frame phase correction means in the base station equipment send in the 10th invention and receive the commo data according to individual in this way through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively, and having enabled it to amend the transmitting phase of self-equipment based on the notified phase contrast information.
[0040] (K-1) Furthermore, in the 11th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.
[0041] Namely, (1) When there is the multiple address of the same commo data addressed to the change candidate of a communication channel from the migration CCE, In having a communication channel between the mobile station equipment which applies self-equipment to the change of the communication channel concerned actually It is characterized by having a notice means of an identification code to notify beforehand the identification code corresponding to the initial data of degree frame period determined in consideration of the base station equipment which is newly due to set up a communication channel to other base station equipments which newly plan a setup of a communication channel.
[0042] (K-2) The identity of the contents of data of the transmission frame transmitted from two or more base station equipments concerning the change of a communication channel in the case of a software handover can be guaranteed by having formed the notice means of an identification code in the base station equipment send in the 11th invention and receive the commo data according to individual in this way through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.
[0043] (L-1) Furthermore, in the 12th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means in the base station equipment which sends and receives the commo data according to individual, respectively through the communication channel according to individual set up between 1 or two or more mobile station equipment of each.
[0044] That is, when the notice of the identification code by which the equipment concerned is given to the initial data of degree frame is received from other base station equipments which have a communication channel actually between the mobile station equipment with which self-equipment changes a communication channel after this, it is characterized by to have a transmission-frame generation means discriminates the commo data corresponding to the identification code concerned from the commo data by which the multiple address was carried out from the migration CCE, and generate the following transmission frame by making the commo data concerned into initial data.
[0045] (L-2) The identity of the contents of data of the transmission frame transmitted from two

or more base station equipments concerning the change of a communication channel in the case of a software handover can be guaranteed by having formed the transmission-frame generation means in the base station equipment send in the 12th invention and receive the commo data according to individual in this way through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.

[0046] (M) Furthermore, in the 13th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.

[0047] Namely, (1) A synchronizing signal transmitting means according to claim 10 and (2) The notice means of transmitting phase contrast according to claim 10, and (3) A transmission-frame phase correction means according to claim 11 and (4) The notice means of an identification code according to claim 12, and (5) It is characterized by having a transmission-frame generation means according to claim 13.

[0048] Thus, it is the above (1) to the base station equipment send and receive the commo data according to individual in the 13th invention through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively. - (5) By having established each shown means Even if it is the case where it is operating with the clock in which each base station equipment carried out mutually-independent, the phase simulation of the transmission frame sent out from both base station equipment at the time of a change can be guaranteed, and, moreover, fear of failure of a software handover can also be abolished.

[0049] (N-1) Furthermore, in the 14th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.

[0050] Namely, (1) An error-detection means acquire the reliability of the received data which were received and were recovered from mobile station equipment based on an error detection result at the time of the change of a communication channel, and (2), by making into reliability information reliability acquired by the error detection means, it adds to received data and it is characterized by to have a reliability information addition means send out to the migration communications control station equipment with which self-equipment is held.

[0051] (N-2) The reliability of the received data sent to the migration CCE with which self-equipment processes the received data received from mobile station equipment from self-equipment can be notified by having formed the error-detection means and the reliability information addition means in the base station equipment send in the 14th invention and receive the commo data according to individual in this way through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively. Thereby, the dependability of the going-up received data at the time of software handover activation can be raised as the whole system.

[0052] (O-1) In the 15th invention, it is characterized by having the following means in the mobile station equipment which sends and receives commo data through a communication channel with the base station equipment which has jurisdiction [ service area / in which self-equipment is located / communication link ].

[0053] Namely, (1) A phase contrast detection means to detect the transmitting phase contrast which exists between the transmitting phase of the transmission frame alignment signal received from the base station equipment which has a communication channel actually, and the transmitting phase of the transmission frame alignment signal received from the base station equipment which newly plans a setup of a communication channel, (2) It is characterized by having a notice means of transmitting phase contrast to notify to the base station equipment which has a communication channel actually between self-equipment by making into phase contrast information transmitting phase contrast detected by the phase contrast detection

means.
[0054] (O-2) Also when operating with the clock with which each base station equipment became independent by forming a phase contrast detection means and the notice means of transmitting phase contrast in mobile station equipment, and having notified the transmitting phase contrast which exists between the base station equipment concerning the change of a communication channel to the base station equipment side in the 15th invention in this way, it can make it possible to make the transmitting phase in agreement. Thereby, a GPS receiver can be lost from mobile station equipment or base station equipment.
[0055] (P-1) Set to the 16th invention and it is migration communication system (1) At least one migration communications control station equipment according to claim 5 to 9 connected to the communication network, (2) Two or more base station equipments according to claim 10 to 15 connected to migration communications control station equipment, and (3) It is characterized by having two or more mobile station equipments according to claim 16 to 18 connected to at least one of two or more base station equipments.
[0056] Thus, it sets to the 16th invention and is the above (1) to migration communication system. - (3) By having established each shown means, a software handover can be performed certainly and, moreover, the simple and economical system which can also abolish needs, such as a GPS receiver, can be constituted.
[0057]
[Embodiment of the Invention] Hereafter, the operation gestalt which applied this invention to CDMA communication system is explained, referring to a drawing.
[0058] (A) The whole CDMA communication system block diagram 1 concerning an operation gestalt is a conceptual diagram showing the topology of the CDMA communication system concerning an operation gestalt. The CDMA communication system shown in drawing 1 is constituted by three sets of three sets of one set (namely, MCC) of the migration communications control office 102 connected to the communication network 101, and the base stations 103-105 connected and held in this through the cable way, and the mobile stations 106-108 which set up either and a wireless propagation path at least among these base stations, and communicate user data. In addition, in drawing 1 , the wavy line shows the communication link service areas (cel) 109-111 offered by each base stations 103-105.
[0059] Among these, MCC102 and a communication network 101 are connected with the suitable transmission-line interface specified by SDH. In addition, transmission / exchange gestalt between a communication network 101 and MCC102 may be an Asynchronous Transfer Mode (it is called "ATM" Asynchronous Transfer Mode and the following), or may be a synchronous transfer mode (it is called "STM" Synchronous TransferMode and the following).
[0060] Moreover, each base stations 103-105 and MCCI02 are connected with the suitable transmission-line interface specified by each by SDH. In addition, when connecting by ATM, as an interface in each base station, it gets down, and an ATM-STM inverter is needed for a circuit, and a STM-ATM inverter is needed for an uphill circuit, although ATM or STM is sufficient as transmission / exchange gestalt between MCCI02 and each base station 103-105.
[0061] Furthermore, each mobile stations 106-108 and each base stations 103-105 are communicating as follows, respectively. For example, the mobile station 106 is communicating with the base station 103, and the mobile station 107 is communicating to a base station 103 and a base station 104, and coincidence. Moreover, the mobile station I08 is communicating with neither of the base stations. In addition, each mobile stations 106-108 communicate between the base stations where the best receive state is acquired from each base station among the input signals which received through the wireless propagation path. Therefore, a base station is switched with the migration in a cel from a cel. Thus, it is called handover that a mobile station communicates with two or more base stations at the time of a change-over. In the case of drawing 1 , the condition of a mobile station 107 is a handover. In addition, when a mobile station communicates to two or more base stations and coincidence, the cel diversity effectiveness is acquired, transmitted power is reduced, and it becomes possible to control interference given to an other station.
[0062] moreover, these mobile stations 106-108 — at least one or more base stations, MCC102,

and the communication link rope 101 — minding — other terminals — or it communicates with other mobile stations which belong in the same system again through one or more base stations held in MCCI02.

[0063] (B) The block diagram 2 of the configuration (B-1) MCC of each part which constitutes CDMA communication system is a block diagram showing the internal configuration of MCC102 among the CDMA communication system concerning this operation gestalt. In addition, connection relation is the same as drawing 1 . That is, MCC102 is connected with the communication network I01, the base station 103, and the base station 104. However, in the case of drawing 2 , the connection with a base station 105 is omitted.

[0064] As shown in drawing 2 , MCC102 consists of channel separation equipment 201, a channel multiplexer 202, the time stump additional equipment 203, the time stump decollator 204, multicast equipment 205, the handover memory table 206, routers 207 and 208, clock generation equipment 209, the selection synthesizer unit 210, a channel multiplexer and the clock insertion equipments 211 and 212, channel separation equipment, and clock decollators 213 and 214.

[0065] Among these, routers 207 and 208 and multicast equipment 205 hit the notice means of transmitting phase contrast in the function 5 which turns up the phase contrast information addressed and sent out to the base station equipment which newly plans a setup of a communication channel from the base station which has a communication channel actually, i.e., a claim.

[0066] Moreover, the time stump additional equipment 203 disassembles commo data into a short unit time interval as compared with frame length, and is in charge of the function which adds the identification code of a meaning, i.e., the identification code addition means of claim 6. Similarly multicast equipment 205 hits the multiple address means of claim 6.

[0067] Furthermore, the selection synthesizer unit 210 is in charge of the function which compounds alternatively the received data from the same mobile station to which two or more base stations received, respectively, and restored based on the reliability information, i.e., the selection composition means of claim 9.

[0068] In addition, this MCC102 has managed the handover of each mobile station and a base station, and determines the base station concerning a handover as the receive state information between each base station notified from the mobile station (information which becomes in the group of each base station name (code) and its receive state (the condition of received power, and a receiving SN ratio and others is included)) based on the traffic of each base station.

[0069] (B-2) The block diagram 3 of a base station is a block diagram showing the internal configuration of a base station I03 among the CDMA communication system concerning this operation gestalt. In addition, a base station 104 and a base station 105 also consist of the same configuration as a base station 103.

[0070] As shown in drawing 3 , a base station 103 A clock decollator And channel separation equipment 301, a channel multiplexer And clock insertion equipment 302, the time stump decollator 303, the clock synchronizer 304, the time stump additional equipment 305, frame structure equipment and the offset compensator 306, frame period generation equipment 307, the frame cracking unit 308, channel coding equipment 309, It consists of pilot coding equipment 310, channel decryption equipment 311, the diffusion modulator 312, the diffusion modulator 313, the rake receiving set 314, the carrier modulator 315, a carrier demodulator 316, and antenna equipment 317.

[0071] Among these, each equipment which constitutes a receiving sequence is in charge of the function, i.e., the notice means of transmitting phase contrast of claim 10, to transmit the transmitting phase contrast between the base stations notified from the mobile station.

[0072] Moreover, channel decryption equipment 311 hits the function to acquire the reliability of the received data which were received and were recovered from the mobile station from an error detection result and the function sent out to a migration communications control station by making acquired reliability into reliability information, i.e., the error detection means of claim 15, and a reliability information addition means.

[0073] Furthermore, frame structure equipment and the offset compensator 306 are in charge of the function which amends the transmitting phase contrast between the base stations notified

from the mobile station through other base stations, i.e., the transmission-frame phase correction means of claim 11. In addition, in addition to this, this frame structure equipment and the offset compensator 306 are in charge of the function which notifies the identification code which identifies this with a law to the initial data of degree frame period to other base stations, i.e., the notice means of an identification code of claim 12, when it has a communication channel between mobile stations actually. Furthermore, this frame structure equipment and the offset compensator 306 are in charge of the function which generates degree frame based on the identification code notified from the base station which has a communication channel actually, i.e., the transmission-frame generation means of claim 13, when it is newly due to set up a communication channel between mobile stations.

[0074] (B-3) The block diagram 4 of a mobile station is a block diagram showing the internal configuration of a mobile station 107 among the CDMA communication system concerning this operation gestalt. In addition, a mobile station 106 and a mobile station 108 also consist of the same configuration as a mobile station 107.

[0075] As shown in drawing 4 , a mobile station 107 consists of antenna equipment 401, the carrier demodulator 402, the carrier modulator 403, the rake-receiving set 404, the diffusion modulator 405, channel decryption equipment 406, the pilot extractor 407, channel coding equipment 408, the frame cracking unit 409, the frame phase measuring device 410, frame structure equipment 411, information source coding equipment (decoder) 412, offset count equipment 413, information source coding equipment (encoder) 414, and a receive state measuring device 415.

[0076] Among these, offset count equipment 413 is in charge of the function, i.e., the phase contrast detection means of claim 16, to detect the phase contrast of the transmitting phase which exists among two or more base stations.

[0077] Moreover, frame structure equipment 411 is in charge of the function which notifies the detected phase contrast information to a base station, i.e., the notice means of transmitting phase contrast of claim 16.

[0078] Furthermore, the rake receiving set 404 is in charge of the function to which compounds the input signal received from two or more base stations, and it restores, i.e., the input-signal recovery means of claim 17.

[0079] Furthermore, the receive state measuring device 415 is in charge of the function which measures the receive state (a receiving SN ratio and received power) about each input signal received from two or more base stations, i.e., the receive state measurement means of claim 18.

[0080] In addition, frame structure equipment 411 is in charge of the function notified to a base station by making the measured receive state into receive state information, i.e., the notice means of a receive state of claim 18.

[0081] (C) Explain the data flow of the going-down link and going-up link by each equipment to the communication link actuation **** beginning performed in the CDMA communication system concerning an operation gestalt.

[0082] (C-1) actuation (C-1-1) of MCC — get down, and link motion MCC102 gets down, and explain link motion. In the communication network 101 located in the exterior of this system, Time Division Multiplexing of the data of two or more connections between terminals is carried out, they are transmitted, and this is sent to MCC102. MCCl02 will divide this into each channel, if the data which Time Division Multiplexing was carried out and have been transmitted are inputted into channel separation equipment 201. The separated data are inputted into the time stump additional equipment 203, and a time stump is further added for every fixed amount of data.

[0083] For example, a short cel is used in layered-izing which shares one ATM cel between two or more communication link connections. A sequence number is added to the short cel to the equal amount of data for every connection. This sequence number is realized as a time stump. This time stump is reset and patrolled with the period of the wireless frame 10 between a base station and a mobile station [ms].

[0084] In addition, in each of channel separation equipment 201 and the time stump additional equipment 203, termination of the protocol of the DEKU link layer of an external communication

network is carried out, and the protocol of the data link layer of this system is carried out.
[0085] Thus, the data with which the time stump was added are inputted into multicast equipment 205. Moreover, after the commo data sent and received between [ in this system ] terminals is turned up by this multicast equipment 205 with a router 207, it is inputted into it.
[0086] Multicast equipment 205 recognizes the connection who carries out the handover between base stations by searching the handover memory table 205, carries out the multicast of data to the corresponding connection, and passes each data to a router 208. Here, a router 208 distributes the data by which the multicast was carried out to two or more base stations concerned with the handover between base stations. However, in the case of the data of the connection without regards to the handover between base stations, the multicast equipment 205 concerned does not perform a multicast, but passes it to a router 208 as it is.
[0087] A channel multiplexer and the clock insertion equipments 211 and 212 input one or more connections' data, carry out multiplex [ of them ], and transmit them to each of base stations 103 and 104. Here, the clock inputted from clock generation equipment 209 is inserted as a synchronizing signal. For example, when transmission speed is 1.544 [Mbits/s], the clock of 8 [kbits/s] is inserted.
[0088] (C-1-2) Explain going-up link motion, next actuation of the going-up link in MCC102. The data multiplex transmitted from base stations 103 and 104 is inputted into a clock decollator and the channel separation equipments 213 and 214, respectively, and a clock is separated. A clock decollator and the channel separation equipments 213 and 214 take a synchronization, and separate the data by which multiplex is carried out from the taken-out clock. The data on the separated channel pass along the selection synthesizer unit 210, and are inputted into a router 207.
[0089] The selection synthesizer unit 210 searched the connection in connection with a handover on the handover memory table 206, carried out selection composition of received data per wireless frame at the time of handover operation of the corresponding connection, and has acquired the cel diversity effectiveness. For details, it mentions later.
[0090] It judges whether a router 207 is the terminal with which the terminal of the partner who communicates has connected the data concerned to this system, and the terminal which must be connected also with it through the external communication network 101, if data are inputted. Here, if the data concerned are addressing to a terminal connected to this system, as it turns up here and being mentioned above, they will input into multicast equipment 205. On the other hand, in being the terminal which must be connected through the external communication network 101, it has set to the time stump decollator 204, and termination of the protocol of this system is carried out, and it performs conversion which united with the protocol of the external communication network 101 in the channel multiplexer 202.
[0091] (C-2) Explain the actuation of a going-down link when it is a base station get down actuation (C-2-1), and according to the link motion base station 103. An input of the data multiplex sent from MCC102 of a clock decollator and channel separation equipment 301 sets the clock inside a base station by the clock synchronizer 304 with reference to the clock which divided this into each channel and was separated further. A phase-locked loop circuit (it is called a "PLL circuit" Phase-Locked Loop Circuit and the following) is used for this. By existence of a PLL circuit, the clock of a base station 103 becomes possible [ the phase lag by transmission only existing as compared with the clock of MCC102, and having the same clock, consequently calculating the same time amount ].
[0092] The back time stump inputted into the time stump decollator 303 is separated, and the data outputted from a clock decollator and channel separation equipment 301 are sent to frame structure equipment and the offset compensator 306. Here, frame structure equipment and the offset compensator 306 constitute the data concerned on the frame which is the unit transmitted in the wireless section. As for the data constituted by the frame, convolutional-code-izing, an interleave, etc. are error-correcting-code-ization-processed in channel coding equipment 309. In addition, the data after this error correcting code-ized processing are diffused to diffusion bandwidth in the diffusion modulator 312. For example, if the symbol rate after an error correction is set to 64 [k symbols/s], this will be made into the signal of 4.096 [M chips/s]

[MHz]5, i.e., a diffusion band, by being spread 64 times.
[0093] On the other hand, it is inputted into frame period generation equipment 307, counts about the clock separated in a clock decollator and channel separation equipment 301, and is used for count of a frame period. A pilot signal is generated by passing through suitable coding in this pilot coding equipment 310. This pilot signal is diffused to a diffusion band in the diffusion modulator 313. In the carrier modulator 315, addition composition is carried out with the user signal after other diffusion, a radio frequency becomes irregular further, and said diffused pilot signal and said diffused user signal are emitted from antenna equipment 317. That is, it is transmitted to the mobile station located in a cel.
[0094] (C-2-2) Explain going-up link motion, next the going-up link motion by the base station 103. If antenna equipment 317 receives the signal from two or more mobile stations by minding a wireless propagation path, a base station 103 will give this to the carrier demodulator 316, and will make it the signal of a diffusion band. Then, the signal to which it restored is given to the rake receiving set 314, and the amendment and multi-pass composition of phase rotation by phasing are performed together with back-diffusion-of-electrons processing. This restores to the received-signal to the signal of a baseband band.
[0095] Thus, in channel decryption equipment 311, error correction processing of day interleave processing, Viterbi decoding, etc. is performed by the signal to which it restored to a baseband band. Furthermore, the data after error correction processing termination are disassembled from a wireless frame in the frame decollator 308. Thereby, termination of the wireless interface is carried out.
[0096] the output data of the frame cracking unit 308 are inputted into the time stump additional equipment 305 — having — etc. — addition of the time stump for every data is made. Thus, the unit which adds a time stump is called a mini frame. For example, when the unit of a mini frame is 1 [ms] at the time of the data transmission of 32 [kbits/s], a time stump will be added to the user amount of data of 4[bytes]. By the channel multiplexer and clock insertion equipment 302, multiplex is carried out to other channels, a clock is inserted further, and the data with which the time stump was added are transmitted to MCC102.
[0097] (C-3) Explain actuation of the get down actuation (C-3-1), and according to link motion mobile station 107 going-down link reception in which it is a mobile station. The diffusion signal received with antenna equipment 401 through the wireless propagation path is inputted into the carrier demodulator 402, and it restores to it to the signal of a diffusion band. In the rake receiving set 404, the back diffusion of electrons of the diffusion band signal is carried out to the signal of a baseband band. The rake receiver 404 compounds the multi-pass produced by reflection of amendment of the phase rotation by phasing generated with migration of a mobile station, the building in a wireless propagation path, etc., and improves receiving gain.
[0098] In channel decryption equipment 406, error correction processing of a day interleave, Viterbi decoding, etc. is carried out by the baseband signaling outputted from the rake receiving set 404. In addition, further, it passes in the frame cracking unit 406, symbols, such as DDA, are removed, and it is taken out from the data after error correction processing as user data. This user data is changed into the condition that a user can recognize, in information source coding equipment (decoder) 412. For example, when the data which are a candidate for transmission are voice, the information source coding equipment 412 concerned is G729. By 32 k-ADPCM etc., the data by which voice coding was carried out are decoded and a sound signal is acquired.
[0099] (C-3-2) Explain going-up link motion, next actuation of the uphill link transmission by the mobile station 107. The information from a user is changed into digital data in information source coding equipment (encoder) 414. In addition, when the direct input of the digital signal is carried out from a user, this conversion actuation is not performed.
[0100] A digital signal is inputted into frame structure equipment 411, and can be carved into the data unit transmitted to a wireless propagation path. Furthermore, in channel coding equipment 408, to this data, error correcting code-ization of convolutional-code-izing, an interleave, etc. is performed, and it is spread to diffusion bandwidth with the diffusion modulator 405 to it. Further, in the carrier modulator 403, even a radio frequency band becomes irregular, and diffusion band data are emitted into a wireless propagation path through antenna equipment.

[0101] (D) Explain the procedure for carrying out a software handover in the conditions which will be the requisite of operation (D-1) concerning a software handover, next the CDMA communication system concerned. ——
[0102] Get down, in order that two base stations 103 and 104 and mobile stations 107 in the arrangement shown in drawing 1 may carry out a software handover, and in a link, that first, it is the need the base stations 103 and 104 which are carrying out clock subordination in MCC102 -- uniting the phase of each wireless frame 10 [ms] to transmit — And it is that the same information transmitted to each base station 103 and 104 is carried and transmitted to the wireless frame of this timing from MCCI02. And this needs to be carried out by low delay. At this time, the maximum ratio composition reception is realized in the rake receiving set 404 of a mobile station 107.
[0103] the frame to which it was transmitted in the mobile station 107 on the other hand in the uphill link that it is the need — base stations 103 and 104 — that result after each receiving and performing error detection of a frame with a Cyclic Redundancy Check sign (it is called "CRC" CyclicRedundancy Check and the following) — 1 [bit] In adding as reliability information, and MCCI02, it is line trap ****** about selection composition based on this reliability information.
[0104] (D-2) Explain a series of actuation which gets down and is performed in a link motion going-down link using drawing 5 -- drawing 9 . The actuation concerned which gets down and is performed in a link can be divided into the actuation (2nd actuation) which carries the same data in the transmission frame sent out from the actuation (1st actuation) which synchronizes the transmitting phase by which it is ** carried out in steps SP1 and SP2, and two or more base stations concerning the change of the communication link frame shown in steps SP3 and SP4.
[0105] First, the 1st actuation is explained using drawing 6 and drawing 7 . These drawing 6 and drawing 7 show the procedure in which a base station 104 unites a phase with the wireless frame of a base station 103 for the phase of the wireless frame. Each base stations 103 and 104 had frame period generation equipment 307 of a proper, respectively, with the frame phase generated in each, carried out the diffusion modulation of the pilot signal, and have transmitted it.
[0106] At the time of a setup of the call between a base station 103 and a mobile station 107, frame structure equipment and the offset compensator 306 form the frame of User Information in accordance with the phase of the frame period generation equipment 307 of a base station 103. Like drawing 6 , in case a mobile station 107 is applied to operation of a handover, it measures the phase contrast of the pilot signal of a base station 103 and a base station 104, and notifies it to the base station 103 under communication link (step SP 1).
[0107] The pilot extractor 407 inputs the signal of the baseband band where the rake receiving set 404 in a mobile station 107 was first obtained in the diffusion band signal by performing the back diffusion of electrons with the diffusion sign of a pilot signal, and these actuation begins from taking out a pilot signal from here. After the phase of the taken-out pilot signal is measured in the frame phase measuring device 410, it is given to offset count equipment 413. This offset count equipment 413 calculates phase contrast from the measurement result of the phase of the pilot signal of a base station 103 inputted through this processing, and the phase of the pilot signal of a base station 104. Incidentally, the pilot extractor 407 consists of filters which remove the fluctuation of a high period by phasing using an integrating circuit. Moreover, offset is measured and calculated per diffusion modulation chip in the diffusion modulator 405 after this.
[0108] Thus, if the offset which exists between the base stations concerning a change is returned to a base station 103, next, it will shift to processing of a step SP 2. That is, as shown in drawing 7 , offset information is notified to a base station I04 via a base station 103 and MCC102. Here, it receives in the frame structure equipment and the offset compensator 306 in self-equipment, and a base station 104 transmits the user data with which only this offset amended the transmitting phase. The phase of the wireless frame of a base station 103 and a base station 104 is made in agreement by the above processing.
[0109] Next, the 2nd actuation is explained using drawing 8 . This drawing 8 is drawing which explains the approach of base stations 103 and 104 which constitutes a wireless frame, respectively. In addition, in drawing 8 , the unit to which the time stump is added, 1 [ i.e., ], [ms] is called a mini frame. Moreover, in this drawing 8 , the multiple address of the mini frame to

which it was already decomposed into and the mini frame number was given by MCC102 shall be carried out to base stations 103 and 104 (step SP 3).
[0110] Now, in drawing 8 , since the base station 103 which is communicating through the communication channel actually delays the transmitted data by 1 mini frame, it operates so that a frame may be constituted. That is, the base station 103 of drawing 8 operates so that degree frame may not be constituted from a mini frame "5" which has already reached self-equipment but a frame may be constituted from a mini frame "4" which has arrived before 1 mini frame. This is for guaranteeing that the same information has reached the base station 104 concerning the handover point, i.e., the base station of drawing 8 .
[0111] Thus, if constituting a frame from a mini frame "4" is determined, the base station 103 concerned will notify the mini frame number which is the head of a frame to a base station 104 through MCC102 (step SP 4). On the other hand, a base station 104 constitutes a frame based on this notice, and transmission of the frame started from the same mini frame "4" as a base station 103 is started at the time of initiation of a handover (step SP 5).
[0112] Diversity reception is realized in the rake receiving set 404 of a mobile station 107 by the generation of a wireless frame based on this offset amendment and a mini frame sequence number.
[0113] In addition, although explanation is omitted here, MCC102 has determined the base station used as the change timing of a communication channel, and the candidate for a change based on the information returned to a base station 103 from a mobile station 107. That is, since the mobile station 107 is always observing existence of the base station which is almost the same as the base station of the communication channel used for the current communication link, or can acquire the receive state beyond it, made the group a base station name (code) and its receive state and has returned this observation result with the receive state measuring device (the information about the base station under current and communication link is also included), it has determined the base station where MCC102 becomes a candidate for a change based on this information, and its change timing.
[0114] (D-2) Explain to the uphill link motion last a series of actuation performed in an uphill link using drawing 9 R> 9. Drawing 9 expresses notionally actuation of the selection composition means 210 formed in the going-up link of MCCI02.
[0115] the wireless frame transmitted from the mobile station 107 — base stations 103 and 104 — pass addition of the reliability information on 1 [bit] on the frame which was alike, respectively, set and was received and which post-error detection was carried out and was reconfigurated — it is transmitted to MCCI02. This is realized by being added to that of a short cel at DDA.
[0116] MCC102 writes the connection number which minds a base station 103 from a mobile station 107 at the time of handover operation decision, and the connection number through a base station 104 in the handover memory table 206. MCCI02 — base stations 103 and 104 — respectively — since — the connection number of the data multiplexed is searched and the connection in connection with a handover is detected. The reliability information on the data of the 1st corresponding connection is checked, when you have no error, it adopts, and in with an error, waiting and the reliability information on the 2nd connection's data are checked for fixed time amount for the data of the 2nd connection of another side to arrive. When you have no error here, the 2nd connection's data are adopted.
[0117] Selection composition based on information is realized whenever [ reliability / in / as mentioned above / MCC102 ].
[0118] (E) the effectiveness realized by the CDMA communication system by the operation gestalt — the ** which a communication network 101, MCC102, base stations 103-105, and mobile stations 106-108 are alike, respectively, and does not hold a GPS receiver according to this operation gestalt as mentioned above — it can constitute — small [ of equipment ] — and low cost-ization is realizable.
[0119] Moreover, since a software handover is surely made, in the conventional system, failure of the software handover which existed can be lost and it becomes possible to perform voice communication and data communication good.

[0120] Furthermore, in the transmitted power control performed proper, it can be clear increase size in the number of mobile stations connectable with per one base station because the rate of the mobile station of the condition of a software handover increases.
[0121] (F) Although the case where prepared the function to guarantee the synchronization of a transmitting phase in the above-mentioned operation gestalt which are other operation gestalten to all a communication network 101, MCC102, the base stations 103-105, and mobile stations 106-108, and a GPS receiver was lost from a system was described, you may make it guarantee by the function by the GPS receiver as usual about this synchronous functional division. Even if such, since the identity of the transmit data transmitted from each base station is guaranteed by the above-mentioned time stump function, it can perform a positive software handover.
[0122] Moreover, in order to guarantee the identity of the contents of a frame transmitted between the base stations concerning a software handover in an above-mentioned operation gestalt at the time of software handover activation, the case where the initial data were notified mutually was described, but also when not preparing the function for guaranteeing the identity of transmit data when there is no possibility that a gap may arise in the time of arrival of the multiple address data resulting from a transit delay etc., it can apply.
[0123]
[Effect of the Invention]
(A) as mentioned above, according to the 1st invention, each base station equipment is mutually-independent by including the processing which amends the transmitting phase contrast of the transmission frame alignment signal which exists among two or more base station equipments concerning the change of a communication channel by the notice from mobile station equipment — even when operating with the clock the bottom, the communication channel change control approach that the phase simulation of the transmission frame sent out from each base station equipment can guarantee can realize.
[0124] (B) Moreover, as compared with frame length, the communication channel change control approach in which the adjustment of transmit timing and the guarantee of the identity of transmit data by the short unit time interval are possible is realizable according to the 2nd invention as mentioned above by having prepared the processing which notifies beforehand the identification code corresponding to the initial data of degree frame period mutually between the base station equipment concerning a change.
[0125] (C) According to the 3rd invention, still as mentioned above, the communication channel change control approach which doubles and has the 1st and 2nd effects of the invention can be realized.
[0126] (D) By having considered as the configuration in which it had been received by each of two or more base station equipments from mobile station equipment, and it compounds commo data alternatively in the 4th invention still as mentioned above based on the reliability information, the dependability of the received data received on the occasion of a software handover can be raised, and the communication channel change control approach in which a positive software handover is possible can be realized.
[0127] (E) Moreover, the phase contrast information which was notified to the base station equipment which has a communication channel actually from mobile station equipment as mentioned above according to the 5th invention By having established a notice means of transmitting phase contrast to notify to the base station equipment which plans a setup of a new communication channel Also when both equipments are operating with the clock which became independent, respectively, the migration communications control office equipment which can make in agreement the transmitting phase of the commo data transmitted from each base station equipment can be realized.
[0128] (F) According to the 6th invention, still as mentioned above, the migration communications control station equipment which can realize guarantee of the identity of the transmission frame generated in each base station equipment and compaction of a time delay can be realized by disassembling commo data into a short unit time interval as compared with frame length, and giving the identification code of a meaning to this using an identification code addition means and a multiple address means, and having been made to carry out the multiple

address to each base station equipment.
[0129] (G) According to the 7th invention, still as mentioned above, the migration communications control office equipment which doubles and has the 5th and 6th effects of the invention can be realized.
[0130] (H) According to the 8th invention, still as mentioned above, the migration communications control station equipment which raises the dependability of received data and can realize a positive software handover can be realized using a selection composition means by compounding alternatively not only the received data received from the base station equipment which has a communication channel actually but the received data received in other base station equipments, and using them as uphill received data.
[0131] (I) According to the 9th invention, a synchronizing signal transmitting means and the notice means of transmitting phase contrast are used as mentioned above again. the transmitting phase contrast of the synchronizing signal which exists between the self-equipment which received the notice from mobile station equipment, and other base station equipments -- being concerned -- others -- by having made it notify to base station equipment Even when operating with the clock in which each base station equipment carried out mutually independent, the base station equipment which can guarantee the phase simulation of the transmission frame sent out from each base station equipment can be realized.
[0132] (J) Moreover, even when self-equipment is operating as mentioned above with the clock which became independent of other equipments by having amended the transmitting phase of self-equipment based on the notified phase contrast information using the transmission-frame phase correction means according to the 10th invention, the base station equipment which can guarantee the synchronization of the transmitting phase of a transmission frame can be realized among other equipments.
[0133] (K) According to the 11th invention, use the notice means of an identification code still as mentioned above. By having made it notify to other base station equipments by making into an identification code the contents of the initial data of the transmission frame sent out with degree frame in the case of the change of a communication channel Also when the identity of the time of day when the same data arrive for a propagation delay cannot guarantee, the base station equipment which can guarantee the identity of the data transmitted as a transmission frame from two or more base station equipments can be realized.
[0134] (L) According to the 12th invention, still as mentioned above, the base station equipment which can perform a software handover certainly can be realized by generating a transmission frame using a transmission-frame generation means by making into initial data the commo data corresponding to the identification code notified from other base station equipments, and having enabled it to guarantee the identity of the transmission frame transmitted from other base station equipments concerning the change of a communication channel, and the contents of data.
[0135] (M) According to the 13th invention, still as mentioned above, the base station equipment which doubles and has the 10th, 11th, and 12th effects of the invention can be realized.
[0136] (N) According to the 14th invention, still as mentioned above, the base station equipment which can raise the dependability of uphill received data as the whole system can be realized by having notified the reliability of the received data which self-equipment received to the migration CCE which processes the received data which self-equipment received using an error detection means and a reliability information addition means.
[0137] (O) Also when operating still as mentioned above using a phase contrast detection means and the notice means of transmitting phase contrast with the clock with which each base station equipment became independent by having notified the transmitting phase contrast which exists between the base station equipment concerning the change of a communication channel to the base station equipment side according to the 15th invention, the mobile station equipment which can make the transmitting phase in agreement can be realized.
[0138] (P) According to the 16th invention, still as mentioned above, the migration communication system which can realize a software handover simply and certainly as compared with the former can be obtained as a whole by having constituted migration communication

system using the migration communications control office equipment concerning each above-mentioned invention, base station equipment, and mobile station equipment.

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TECHNICAL FIELD

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[Field of the Invention] This invention can be applied to personal communication system (it is called "PCS" Personal Communication Services and the following) or the migration communication system using a code-division-multiple-access (it is called "CDMA" Code Division Multi Access and the following) method as an access method like digital cellular one, concerning migration communication system. Moreover, this invention relates to the mobile station equipment as each component which constitutes this migration communication system, base station equipment, and the migration communications control station (it is called "MCC" Mobile Communication Control Center and the following) equipment of a high order. Furthermore, this invention relates to the communication channel change control approach used in this migration communication system.

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PRIOR ART

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[Description of the Prior Art] There is for example, the following reference as conventional reference which carried out CDMA communication system ****** description. reference: "Mobile Station-Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular System, TIA/EIA/IS-95, July 1993, and U.S.A." — the national form method about the wireless interface which connects to this reference between the mobile station which builds CDMA communication system, and a base station is described.
[0003] In this conventional CDMA communication system, it has the composition of transmitting information with the transmission speed which specified the transmission line which connects between MCC and each base station by the Synchronous Digital hierarchy (it is called "SDH" Synchronous Digital Hierarchy and the following), and was specified in SDH. In addition, MCC is transmitting User Information (speech information and the information on computer data and others are included) and control information about two or more mobile stations which exist in the communication link service area of each base station by carrying out Time Division Multiplexing of the transmission line concerned.
[0004] Moreover, in this conventional CDMA communication system, all mobile stations, the base stations, and MCC hold the receiver of a global positioning system (henceforth "GPS"), and after each equipment which constitutes the communication system concerned has synchronized mutually with time of day absolutely, it is operating. For this reason, also when changing to other base stations from a certain base station from a base station to a mobile station which gets down and is communicating a link, it becomes possible to transmit the same information in the condition of having synchronized, from two or more base stations, and the maximum ratio composition diversity reception has come turn on a mobile station side. Thereby, it gets down and a break appears in a signal at the time of a link change. This is called software handover.
[0005] Moreover, by carrying out a software handover and using cel diversity by the CDMA communication link which performs transmitted power control, for interference reduction of a communication link of other users, reduction of transmitted power is enabled, the number of the mobile stations which can connect per one base station can be increased, and the communication link effectiveness of the whole system can be improved now.

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## EFFECT OF THE INVENTION

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[Effect of the Invention]
(A) as mentioned above, according to the 1st invention, each base station equipment is mutually-independent by including the processing which amends the transmitting phase contrast of the transmission frame alignment signal which exists among two or more base station equipments concerning the change of a communication channel by the notice from mobile station equipment — even when operating with the clock the bottom, the communication channel change control approach that the phase simulation of the transmission frame sent out from each base station equipment can guarantee can realize.
[0124] (B) Moreover, as compared with frame length, the communication channel change control approach in which the adjustment of transmit timing and the guarantee of the identity of transmit data by the short unit time interval are possible is realizable according to the 2nd invention as mentioned above by having prepared the processing which notifies beforehand the identification code corresponding to the initial data of degree frame period mutually between the base station equipment concerning a change.
[0125] (C) According to the 3rd invention, still as mentioned above, the communication channel change control approach which doubles and has the 1st and 2nd effects of the invention can be realized.
[0126] (D) By having considered as the configuration in which it had been received by each of two or more base station equipments from mobile station equipment, and it compounds commo data alternatively in the 4th invention still as mentioned above based on the reliability information, the dependability of the received data received on the occasion of a software handover can be raised, and the communication channel change control approach in which a positive software handover is possible can be realized.
[0127] (E) Moreover, the phase contrast information which was notified to the base station equipment which has a communication channel actually from mobile station equipment as mentioned above according to the 5th invention By having established a notice means of transmitting phase contrast to notify to the base station equipment which plans a setup of a new communication channel Also when both equipments are operating with the clock which became independent, respectively, the migration communications control office equipment which can make in agreement the transmitting phase of the commo data transmitted from each base station equipment can be realized.
[0128] (F) According to the 6th invention, still as mentioned above, the migration communications control station equipment which can realize guarantee of the identity of the transmission frame generated in each base station equipment and compaction of a time delay can be realized by disassembling commo data into a short unit time interval as compared with frame length, and giving the identification code of a meaning to this using an identification code addition means and a multiple address means, and having been made to carry out the multiple address to each base station equipment.
[0129] (G) According to the 7th invention, still as mentioned above, the migration communications control office equipment which doubles and has the 5th and 6th effects of the invention can be realized.

[0130] (H) According to the 8th invention, still as mentioned above, the migration communications control station equipment which raises the dependability of received data and can realize a positive software handover can be realized using a selection composition means by compounding alternatively not only the received data received from the base station equipment which has a communication channel actually but the received data received in other base station equipments, and using them as uphill received data.
[0131] (I) According to the 9th invention, a synchronizing signal transmitting means and the notice means of transmitting phase contrast are used as mentioned above again. the transmitting phase contrast of the synchronizing signal which exists between the self-equipment which received the notice from mobile station equipment, and other base station equipments — being concerned — others — by having made it notify to base station equipment Even when operating with the clock in which each base station equipment carried out mutually-independent, the base station equipment which can guarantee the phase simulation of the transmission frame sent out from each base station equipment can be realized.
[0132] (J) Moreover, even when self-equipment is operating as mentioned above with the clock which became independent of other equipments by having amended the transmitting phase of self-equipment based on the notified phase contrast information using the transmission-frame phase correction means according to the 10th invention, the base station equipment which can guarantee the synchronization of the transmitting phase of a transmission frame can be realized among other equipments.
[0133] (K) According to the 11th invention, use the notice means of an identification code still as mentioned above. By having made it notify to other base station equipments by making into an identification code the contents of the initial data of the transmission frame sent out with degree frame in the case of the change of a communication channel Also when the identity of the time of day when the same data arrive for a propagation delay cannot guarantee, the base station equipment which can guarantee the identity of the data transmitted as a transmission frame from two or more base station equipments can be realized.
[0134] (L) According to the 12th invention, still as mentioned above, the base station equipment which can perform a software handover certainly can be realized by generating a transmission frame using a transmission-frame generation means by making into initial data the commo data corresponding to the identification code notified from other base station equipments, and having enabled it to guarantee the identity of the transmission frame transmitted from other base station equipments concerning the change of a communication channel, and the contents of data.
[0135] (M) According to the 13th invention, still as mentioned above, the base station equipment which doubles and has the 10th, 11th, and 12th effects of the invention can be realized.
[0136] (N) According to the 14th invention, still as mentioned above, the base station equipment which can raise the dependability of uphill received data as the whole system can be realized by having notified the reliability of the received data which self-equipment received to the migration CCE which processes the received data which self-equipment received using an error detection means and a reliability information addition means.
[0137] (O) Also when operating still as mentioned above using a phase contrast detection means and the notice means of transmitting phase contrast with the clock with which each base station equipment became independent by having notified the transmitting phase contrast which exists between the base station equipment concerning the change of a communication channel to the base station equipment side according to the 15th invention, the mobile station equipment which can make the transmitting phase in agreement can be realized.
[0138] (P) According to the 16th invention, still as mentioned above, the migration communication system which can realize a software handover simply and certainly as compared with the former can be obtained as a whole by having constituted migration communication system using the migration communications control office equipment concerning each above-mentioned invention, base station equipment, and mobile station equipment.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, it sets to equipment conventionally based on the standard method described by the above-mentioned reference. It compares with the time amount taken for the information transmitted to time of day with MCC as conditions searched for in order to carry out a software handover to already reach the base station under communication link between mobile stations. The time amount taken for the same information by which multicast transmission was carried out from MCC to the base station which is newly going to join the communication link with a mobile station to arrive had to become short.
[0007] In case this transmits the information which continues like voice, it is for having to hold the link prepared between the already connected base stations. That is, supposing information has not reached the base station of the side which the link formed in a mobile station must transmit information from the base station which newly connects synchronizing with the link currently held actually, and must take a synchronization, it is because it becomes impossible to carry out a software handover. Therefore, when this software handover is unrealizable, the change-over by which an information flow is cut in pieces at the mobile station side which receives continuation data, such as voice, will be carried out. This is called hard handover below as compared with the software handover of information sequence non-hits.
[0008] The probability for the conditions of this software handover to no longer be fulfilled will become high when dispersion is in the distance of the transmission line from MCC to each base station. Then, although the technique of easing the conditions of a software handover by notifying the head of the transmission unit of a wireless interface to each base station from MCC, and inserting delay of fixed time amount for a buffer in each base station was taken, there was no guarantee by which a software handover is surely carried out. Moreover, in order to realize a system synchronization, a mobile station's having to hold a GPS receiver had been restrained when a terminal was constituted at a low price.

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MEANS

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[Means for Solving the Problem] In order to solve this technical problem, in each invention, it is characterized by having the following processings or a means, respectively.
[0010] (A-1) In the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area moves to other adjoining communication link service areas in the 1st invention first, it is characterized by having the following procedure.
[0011] Namely, (1) The mobile station equipment which is a candidate for migration The transmitting phase contrast which exists between the transmitting phase of the transmission frame alignment signal transmitted from the base station equipment which has a communication channel actually, and the transmitting phase of the transmission frame alignment signal transmitted from the base station equipment which newly plans a setup of a communication channel is detected. The phase contrast information concerned The 1st processing notified to the base station equipment which corresponds through the communication channel which exists actually, (2) The base station equipment which received the notice notifies phase contrast information to the base station equipment which newly plans a setup of a communication channel, and is characterized by having the 2nd processing which amends the phase of the transmit data of the schedule transmitted from base station equipment to mobile station equipment.
[0012] (A-2) Set to the 1st invention in this way. The transmission frame alignment signal actually transmitted between mobile station equipment from the base station equipment which has a communication channel, By having considered as the configuration which amends the transmitting phase contrast which exists between the transmission frame alignment signals transmitted from the base station equipment which newly plans a setup of a communication channel based on the phase contrast information to which it is notified from mobile station equipment Even if it is the case where it is operating with the clock in which each base station equipment carried out mutually-independent, the phase simulation of the transmission frame sent out from both base station equipment at the time of a change can be guaranteed. This becomes possible to abolish the need of carrying a GPS receiver in each equipment which constitutes migration communication system.
[0013] (B-1) Moreover, in the 2nd invention, it is characterized by having the following procedure in the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area moves to other adjoining communication link service areas.
[0014] Namely, (1) While holding two or more base station equipments which set up a communication channel between mobile station equipment, and send and receive commo data The migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more base station equipments and mobile station equipment When carrying out the multiple address of the same commo data to two or more mobile station equipments concerning the change candidate of a communication channel, The 3rd processing which disassembles into the data of a short unit time interval the commo data by which the multiple address is carried out as compared with

frame length, and adds the identification code of a meaning to each of the data concerned, (2) The base station equipment which has a communication channel actually the identification code corresponding to the initial data of degree frame period determined in consideration of the base station equipment which is newly due to set up a communication channel It is characterized by having the 4th processing beforehand notified to the base station equipment which is newly due to set up a communication channel.

[0015] (B-2) The identity of the information on the transmission frame by which simultaneous transmission is carried out at the time of a change from the base station equipment which applies the base station equipment which actually transmits commo data to the change concerned in the 2nd invention in this way by having considered the identification code corresponding to the initial data of degree frame period determined in consideration of other base station equipments concerning a change as the configuration which notifies to the base station equipment concerning the change concerned beforehand can be guaranteed. Thereby, a positive software handover can be guaranteed. Moreover, since the time delay needed in order to make initial data in agreement can be set up finely at the identification code which expresses a short unit time interval as compared with frame length, it can perform software handover processing by necessary minimum delay.

[0016] (C) In the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area furthermore moves to other adjoining communication link service areas in the 3rd invention, it is characterized by having the following procedure.

[0017] Namely, (1) The 1st processing according to claim 1 and (2) 2nd processing according to claim 1 (3) The 3rd processing according to claim 2 and (4) It is characterized by having the 4th processing according to claim 2.

[0018] thus, the 3rd invention — setting — the communication channel change control approach — the above (1) - (4) by having prepared each processing, each base station equipment is mutually-independent — even if it is the case where it is operating with the clock the bottom, the phase simulation of the transmission frame sent out from both base station equipment at the time of a change can be guaranteed, and, moreover, fear of failure of a software handover can also be abolished.

[0019] (D-1) In the communication channel change control approach performed in case the mobile station equipment located in a certain communication link service area furthermore moves to other adjoining communication link service areas in the 4th invention, it is characterized by having the following procedure.

[0020] Namely, while holding two or more base station equipments which set up a communication channel between mobile station equipment, and send and receive commo data The migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more base station equipments and mobile station equipment From each of two or more base station equipments involved in the change concerned at the time of the change of a communication channel When each equipment inputs the received data which were received and were recovered from mobile station equipment, it is characterized by having the 5th processing which compounds alternatively the received data into which each base station equipment is inputted from two or more base station equipments based on the reliability information given to the received data concerned.

[0021] (D-2) The dependability of the received data received on the occasion of a software handover can be raised by having considered as the configuration in which it had been received by each of two or more base station equipments from mobile station equipment, and it compounds commo data alternatively in the 4th invention in this way based on the reliability information.

[0022] (E-1) Moreover, in the 5th invention, while holding two or more base station equipments which set up a communication channel between mobile station equipment, and send and receive commo data, in the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more base station equipments and mobile station equipment, it is characterized by having the following

means.
[0023] That is, it is characterized by to have a notice means of transmitting phase contrast notify the phase-contrast information which notified to the base station equipment with which the mobile station equipment which is a candidate for migration corresponds through the communication channel which detects the transmitting phase contrast which exists between the base station equipment which has a communication channel actually, and the base station equipment which plans a setup of a new communication channel, and exists actually to the base station equipment which newly plans a setup of a communication channel.
[0024] (E-2) Set to the 5th invention in this way. By having notified the transmitting phase contrast which exists between the base station equipment concerning the change concerned, before forming the notice means of transmitting phase contrast in the migration CCE which carries out supervisory control of the change of a communication channel and actually performing the change of a communication channel Also when these base station equipment is operating with the clock which became independent, respectively, it becomes possible to make in agreement the transmitting phase of the commo data transmitted from each base station equipment.
[0025] (F-1) While holding two or more base station equipments set up a communication channel between mobile station equipment, and furthermore send and receive commo data in the 6th invention, in the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more base station equipments and mobile station equipment, it is characterized by having the following means.
[0026] Namely, (1) An identification code addition means to disassemble into the data of a short unit time interval the commo data transmitted to mobile station equipment as compared with frame length, and to add the identification code of a meaning to each of the data concerned, and (2) It is characterized by having the multiple address means which carries out the multiple address of the same commo data to which the identification code was given to two or more mobile station equipments concerning the change candidate of a communication channel.
[0027] (F-2) Set to the 6th invention in this way. An identification code addition means and a multiple address means are formed in the migration communication controller which carries out supervisory control of the change of a communication channel. By having been made to carry out the multiple address to the base station equipment which disassembles commo data into a short unit time interval as compared with frame length, gives the identification code of a meaning to this, and is applied to the change of a communication channel It becomes possible to guarantee the identity of the transmission frame generated in two or more base station equipments on the basis of the identification code concerned. Moreover, the processing is realizable by the minimum time delay. Thereby, a positive software handover is guaranteed.
[0028] (G) While holding two or more base station equipments furthermore send and receive commo data in the 7th invention through the communication channel set up between mobile station equipment, in the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more base station equipments and mobile station equipment, it is characterized by having the following means.
[0029] Namely, (1) The notice means of transmitting phase contrast according to claim 5, and (2) An identification code addition means according to claim 6 and (3) It is characterized by having a multiple address means according to claim 6.
[0030] Thus, it is the above (1) to the migration communication controller which carries out supervisory control of the change of a communication channel in the 7th invention. - (3) By having established each shown means Even if it is the case where it is operating with the clock in which each base station equipment carried out mutually-independent, the phase simulation of the transmission frame sent out from both base station equipment at the time of a change can be guaranteed, and, moreover, fear of failure of a software handover can also be abolished.
[0031] (H-1) While holding two or more base station equipments set up a communication channel between mobile station equipment, and furthermore send and receive commo data in the 8th

invention, in the migration communications control station equipment which carries out supervisory control of the change of the communication channel performed between two or more above-mentioned base station equipments and the above-mentioned mobile station equipment, it is characterized by having the following means.

[0032] That is, when the received data which each equipment received and recovered from each of two or more base station equipments involved in the change of the communication channel concerned from mobile station equipment at the time of the change of a communication channel are inputted, it is characterized by to have a selection composition means compound alternatively the received data into which each base station equipment is inputted from two or more base station equipments concerned based on the reliability information given to the received data concerned.

[0033] (H-2) The dependability of the received data received on the occasion of a software handover can be raised by forming a selection composition means in the migration CCE which carries out supervisory control of the change of a communication channel in the 8th invention in this way, compounding alternatively not only the received data received from the base station equipment which has a communication channel actually but the received data received in other base station equipments, and using them as uphill received data.

[0034] (I-1) In the 9th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means again in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.

[0035] Namely, (1) A synchronizing signal transmitting means to transmit to the mobile station equipment which will plan a setup of a communication channel mobile station equipment or from now on which has a communication channel for the transmission frame period signal formed based on the internal clock actually, (2) It follows on the mobile station equipment located in the communication link service area of self-equipment moving to the communication link service area which other adjoining base station equipments offer. When the transmitting phase contrast which exists from the mobile station equipment concerning the migration concerned between the transmission frame alignment signal received from other base station equipments which newly plan a setup of a communication channel, and the transmission frame alignment signal received from self-equipment has been notified as phase contrast information, It is characterized by having a notice means of transmitting phase contrast to notify the phase contrast information concerned, to other adjoining base station equipments.

[0036] (I-2) It sets to the 9th invention in this way. By having formed the synchronizing signal transmitting means and the notice means of transmitting phase contrast in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively While being able to recognize the transmitting phase contrast which exists between the base station equipment applied to the change of a communication channel including self-equipment through mobile station equipment, it becomes possible to abolish the transmitting phase contrast between oneself-and-others equipment by notice to the base station equipment of another side.

[0037] (J-1) Moreover, in the 10th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.

[0038] namely, from other base station equipments When the transmitting phase contrast which exists between the transmission frame period signals of other base station equipments with which a communication channel is actually set up with the transmission frame period signal of the self-equipment to the mobile station equipment which will newly plan a setup of a communication channel from now on, and the communication link is performed is notified as phase contrast information, It is characterized by having a transmission-frame phase correction

means to amend the phase of the transmission frame alignment signal of the newly set-up communication channel, based on the phase contrast information concerned.
[0039] (J-2) The synchronization with other base station equipments concerning a software handover is establishable by forming a transmission-frame phase correction means in the base station equipment send in the 10th invention and receive the commo data according to individual in this way through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively, and having enabled it to amend the transmitting phase of self-equipment based on the notified phase contrast information.
[0040] (K-1) Furthermore, in the 11th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.
[0041] Namely, (1) When there is the multiple address of the same commo data addressed to the change candidate of a communication channel from the migration CCE, In having a communication channel between the mobile station equipment which applies self-equipment to the change of the communication channel concerned actually It is characterized by having a notice means of an identification code to notify beforehand the identification code corresponding to the initial data of degree frame period determined in consideration of the base station equipment which is newly due to set up a communication channel to other base station equipments which newly plan a setup of a communication channel.
[0042] (K-2) The identity of the contents of data of the transmission frame transmitted from two or more base station equipments concerning the change of a communication channel in the case of a software handover can be guaranteed by having formed the notice means of an identification code in the base station equipment send in the 11th invention and receive the commo data according to individual in this way through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.
[0043] (L-1) Furthermore, in the 12th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means in the base station equipment which sends and receives the commo data according to individual, respectively through the communication channel according to individual set up between 1 or two or more mobile station equipment of each.
[0044] That is, when the notice of the identification code by which the equipment concerned is given to the initial data of degree frame is received from other base station equipments which have a communication channel actually between the mobile station equipment with which self-equipment changes a communication channel after this, it is characterized by to have a transmission-frame generation means discriminates the commo data corresponding to the identification code concerned from the commo data by which the multiple address was carried out from the migration CCE, and generate the following transmission frame by making the commo data concerned into initial data.
[0045] (L-2) The identity of the contents of data of the transmission frame transmitted from two or more base station equipments concerning the change of a communication channel in the case of a software handover can be guaranteed by having formed the transmission-frame generation means in the base station equipment send in the 12th invention and receive the commo data according to individual in this way through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.
[0046] (M) Furthermore, in the 13th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.
[0047] Namely, (1) A synchronizing signal transmitting means according to claim 10 and (2) The notice means of transmitting phase contrast according to claim 10, and (3) A transmission-frame phase correction means according to claim 11 and (4) The notice means of an identification code

according to claim 12, and (5) It is characterized by having a transmission-frame generation means according to claim 13.
[0048] Thus, it is the above (1) to the base station equipment send and receive the commo data according to individual in the 13th invention through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively. - (5) By having established each shown means Even if it is the case where it is operating with the clock in which each base station equipment carried out mutually-independent, the phase simulation of the transmission frame sent out from both base station equipment at the time of a change can be guaranteed, and, moreover, fear of failure of a software handover can also be abolished.
[0049] (N-1) Furthermore, in the 14th invention, it holds in migration communications control station equipment with other base station equipments, and is characterized by having the following means in the base station equipment which sends and receives the commo data according to individual through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively.
[0050] Namely, (1) An error-detection means acquire the reliability of the received data which were received and were recovered from mobile station equipment based on an error detection result at the time of the change of a communication channel, and (2), by making into reliability information reliability acquired by the error detection means, it adds to received data and it is characterized by to have a reliability information addition means send out to the migration communications control station equipment with which self-equipment is held.
[0051] (N-2) The reliability of the received data sent to the migration CCE with which self-equipment processes the received data received from mobile station equipment from self-equipment can be notified by having formed the error-detection means and the reliability information addition means in the base station equipment send in the 14th invention and receive the commo data according to individual in this way through the communication channel according to individual set up between 1 or two or more mobile station equipment of each, respectively. Thereby, the dependability of the going-up received data at the time of software handover activation can be raised as the whole system.
[0052] (O-1) In the 15th invention, it is characterized by having the following means in the mobile station equipment which sends and receives commo data through a communication channel with the base station equipment which has jurisdiction [ service area / in which self-equipment is located / communication link ].
[0053] Namely, (1) A phase contrast detection means to detect the transmitting phase contrast which exists between the transmitting phase of the transmission frame alignment signal received from the base station equipment which has a communication channel actually, and the transmitting phase of the transmission frame alignment signal received from the base station equipment which newly plans a setup of a communication channel, (2) It is characterized by having a notice means of transmitting phase contrast to notify to the base station equipment which has a communication channel actually between self-equipment by making into phase contrast information transmitting phase contrast detected by the phase contrast detection means.
[0054] (O-2) Also when operating with the clock with which each base station equipment became independent by forming a phase contrast detection means and the notice means of transmitting phase contrast in mobile station equipment, and having notified the transmitting phase contrast which exists between the base station equipment concerning the change of a communication channel to the base station equipment side in the 15th invention in this way, it can make it possible to make the transmitting phase in agreement. Thereby, a GPS receiver can be lost from mobile station equipment or base station equipment.
[0055] (P-1) Set to the 16th invention and it is migration communication system (1) At least one migration communications control station equipment according to claim 5 to 9 connected to the communication network, (2) Two or more base station equipments according to claim 10 to 15 connected to migration communications control station equipment, and (3) It is characterized by having two or more mobile station equipments according to claim 16 to 18 connected to at least

one of two or more base station equipments.
[0056] Thus, it sets to the 16th invention and is the above (1) to migration communication system. - (3) By having established each shown means, a software handover can be performed certainly and, moreover, the simple and economical system which can also abolish needs, such as a GPS receiver, can be constituted.
[0057]
[Embodiment of the Invention] Hereafter, the operation gestalt which applied this invention to CDMA communication system is explained, referring to a drawing.
[0058] (A) The whole CDMA communication system block diagram 1 concerning an operation gestalt is a conceptual diagram showing the topology of the CDMA communication system concerning an operation gestalt. The CDMA communication system shown in drawing 1 is constituted by three sets of three sets of one set (namely, MCC) of the migration communications control office 102 connected to the communication network 101, and the base stations 103-105 connected and held in this through the cable way, and the mobile stations 106-108 which set up either and a wireless propagation path at least among these base stations, and communicate user data. In addition, in drawing 1, the wavy line shows the communication link service areas (cel) 109-111 offered by each base stations 103-105.
[0059] Among these, MCC102 and a communication network 101 are connected with the suitable transmission-line interface specified by SDH. In addition, transmission / exchange gestalt between a communication network 101 and MCC102 may be an Asynchronous Transfer Mode (it is called "ATM" Asynchronous Transfer Mode and the following), or may be a synchronous transfer mode (it is called "STM" Synchronous TransferMode and the following).
[0060] Moreover, each base stations 103-105 and MCCI02 are connected with the suitable transmission-line interface specified by each by SDH. In addition, when connecting by ATM, as an interface in each base station, it gets down, and an ATM-STM inverter is needed for a circuit, and a STM-ATM inverter is needed for an uphill circuit, although ATM or STM is sufficient as transmission / exchange gestalt between MCCI02 and each base station 103-105.
[0061] Furthermore, each mobile stations 106-108 and each base stations 103-105 are communicating as follows, respectively. For example, the mobile station 106 is communicating with the base station 103, and the mobile station 107 is communicating to a base station 103 and a base station 104, and coincidence. Moreover, the mobile station I08 is communicating with neither of the base stations. In addition, each mobile stations 106-108 communicate between the base stations where the best receive state is acquired from each base station among the input signals which received through the wireless propagation path. Therefore, a base station is switched with the migration in a cel from a cel. Thus, it is called handover that a mobile station communicates with two or more base stations at the time of a change-over. In the case of drawing 1 , the condition of a mobile station 107 is a handover. In addition, when a mobile station communicates to two or more base stations and coincidence, the cel diversity effectiveness is acquired, transmitted power is reduced, and it becomes possible to control interference given to an other station.
[0062] moreover, these mobile stations 106-108 — at least one or more base stations, MCC102, and the communication link rope 101 — minding — other terminals — or it communicates with other mobile stations which belong in the same system again through one or more base stations held in MCCI02.
[0063] (B) The block diagram 2 of the configuration (B-1) MCC of each part which constitutes CDMA communication system is a block diagram showing the internal configuration of MCC102 among the CDMA communication system concerning this operation gestalt. In addition, connection relation is the same as drawing 1 . That is, MCC102 is connected with the communication network I01, the base station 103, and the base station 104. However, in the case of drawing 2 , the connection with a base station 105 is omitted.
[0064] As shown in drawing 2 , MCC102 consists of channel separation equipment 201, a channel multiplexer 202, the time stump additional equipment 203, the time stump decollator 204, multicast equipment 205, the handover memory table 206, routers 207 and 208, clock generation equipment 209, the selection synthesizer unit 210, a channel multiplexer and the clock insertion

equipments 211 and 212, channel separation equipment, and clock decollators 213 and 214.
[0065] Among these, routers 207 and 208 and multicast equipment 205 hit the notice means of transmitting phase contrast in the function 5 which turns up the phase contrast information addressed and sent out to the base station equipment which newly plans a setup of a communication channel from the base station which has a communication channel actually, i.e., a claim.
[0066] Moreover, the time stump additional equipment 203 disassembles commo data into a short unit time interval as compared with frame length, and is in charge of the function which adds the identification code of a meaning, i.e., the identification code addition means of claim 6. Similarly multicast equipment 205 hits the multiple address means of claim 6.
[0067] Furthermore, the selection synthesizer unit 210 is in charge of the function which compounds alternatively the received data from the same mobile station to which two or more base stations received, respectively, and restored based on the reliability information, i.e., the selection composition means of claim 9.
[0068] In addition, this MCC102 has managed the handover of each mobile station and a base station, and determines the base station concerning a handover as the receive state information between each base station notified from the mobile station (information which becomes in the group of each base station name (code) and its receive state (the condition of received power, and a receiving SN ratio and others is included)) based on the traffic of each base station.
[0069] (B-2) The block diagram 3 of a base station is a block diagram showing the internal configuration of a base station 103 among the CDMA communication system concerning this operation gestalt. In addition, a base station 104 and a base station 105 also consist of the same configuration as a base station 103.
[0070] As shown in drawing 3 , a base station 103 A clock decollator And channel separation equipment 301, a channel multiplexer And clock insertion equipment 302, the time stump decollator 303, the clock synchronizer 304, the time stump additional equipment 305, frame structure equipment and the offset compensator 306, frame period generation equipment 307, the frame cracking unit 308, channel coding equipment 309, It consists of pilot coding equipment 310, channel decryption equipment 311, the diffusion modulator 312, the diffusion modulator 313, the rake receiving set 314, the carrier modulator 315, a carrier demodulator 316, and antenna equipment 317.
[0071] Among these, each equipment which constitutes a receiving sequence is in charge of the function, i.e., the notice means of transmitting phase contrast of claim 10, to transmit the transmitting phase contrast between the base stations notified from the mobile station.
[0072] Moreover, channel decryption equipment 311 hits the function to acquire the reliability of the received data which were received and were recovered from the mobile station from an error detection result and the function sent out to a migration communications control station by making acquired reliability into reliability information, i.e., the error detection means of claim 15, and a reliability information addition means.
[0073] Furthermore, frame structure equipment and the offset compensator 306 are in charge of the function which amends the transmitting phase contrast between the base stations notified from the mobile station through other base stations, i.e., the transmission-frame phase correction means of claim 11. In addition, in addition to this, this frame structure equipment and the offset compensator 306 are in charge of the function which notifies the identification code which identifies this with a law to the initial data of degree frame period to other base stations, i.e., the notice means of an identification code of claim 12, when it has a communication channel between mobile stations actually. Furthermore, this frame structure equipment and the offset compensator 306 are in charge of the function which generates degree frame based on the identification code notified from the base station which has a communication channel actually, i.e., the transmission-frame generation means of claim 13, when it is newly due to set up a communication channel between mobile stations.
[0074] (B-3) The block diagram 4 of a mobile station is a block diagram showing the internal configuration of a mobile station 107 among the CDMA communication system concerning this operation gestalt. In addition, a mobile station 106 and a mobile station 108 also consist of the

same configuration as a mobile station 107.
[0075] As shown in drawing 4 , a mobile station 107 consists of antenna equipment 401, the carrier demodulator 402, the carrier modulator 403, the rake receiving set 404, the diffusion modulator 405, channel decryption equipment 406, the pilot extractor 407, channel coding equipment 408, the frame cracking unit 409, the frame phase measuring device 410, frame structure equipment 411, information source coding equipment (decoder) 412, offset count equipment 413, information source coding equipment (encoder) 414, and a receive state measuring device 415.
[0076] Among these, offset count equipment 413 is in charge of the function, i.e., the phase contrast detection means of claim 16, to detect the phase contrast of the transmitting phase which exists among two or more base stations.
[0077] Moreover, frame structure equipment 411 is in charge of the function which notifies the detected phase contrast information to a base station, i.e., the notice means of transmitting phase contrast of claim 16.
[0078] Furthermore, the rake receiving set 404 is in charge of the function to which compounds the input signal received from two or more base stations, and it restores, i.e., the input-signal recovery means of claim 17.
[0079] Furthermore, the receive state measuring device 415 is in charge of the function which measures the receive state (a receiving SN ratio and received power) about each input signal received from two or more base stations, i.e., the receive state measurement means of claim 18.
[0080] In addition, frame structure equipment 411 is in charge of the function notified to a base station by making the measured receive state into receive state information, i.e., the notice means of a receive state of claim 18.
[0081] (C) Explain the data flow of the going-down link and going-up link by each equipment to the communication link actuation **** beginning performed in the CDMA communication system concerning an operation gestalt.
[0082] (C-1) actuation (C-1-1) of MCC -- get down, and link motion MCC102 gets down, and explain link motion. In the communication network 101 located in the exterior of this system, Time Division Multiplexing of the data of two or more connections between terminals is carried out, they are transmitted, and this is sent to MCC102. MCC102 will divide this into each channel, if the data which Time Division Multiplexing was carried out and have been transmitted are inputted into channel separation equipment 201. The separated data are inputted into the time stump additional equipment 203, and a time stump is further added for every fixed amount of data.
[0083] For example, a short cel is used in layered-izing which shares one ATM cel between two or more communication link connections. A sequence number is added to the short cel to the equal amount of data for every connection. This sequence number is realized as a time stump. This time stump is reset and patrolled with the period of the wireless frame 10 between a base station and a mobile station [ms].
[0084] In addition, in each of channel separation equipment 201 and the time stump additional equipment 203, termination of the protocol of the DEKU link layer of an external communication network is carried out, and the protocol of the data link layer of this system is carried out.
[0085] Thus, the data with which the time stump was added are inputted into multicast equipment 205. Moreover, after the commo data sent and received between [ in this system ] terminals is turned up by this multicast equipment 205 with a router 207, it is inputted into it.
[0086] Multicast equipment 205 recognizes the connection who carries out the handover between base stations by searching the handover memory table 205, carries out the multicast of data to the corresponding connection, and passes each data to a router 208. Here, a router 208 distributes the data by which the multicast was carried out to two or more base stations concerned with the handover between base stations. However, in the case of the data of the connection without regards to the handover between base stations, the multicast equipment 205 concerned does not perform a multicast, but passes it to a router 208 as it is.
[0087] A channel multiplexer and the clock insertion equipments 211 and 212 input one or more connections' data, carry out multiplex [ of them ], and transmit them to each of base stations

103 and 104. Here, the clock inputted from clock generation equipment 209 is inserted as a synchronizing signal. For example, when transmission speed is 1.544 [Mbits/s], the clock of 8 [kbits/s] is inserted.

[0088] (C-1-2) Explain going-up link motion, next actuation of the going-up link in MCCl02. The data multiplex transmitted from base stations 103 and 104 is inputted into a clock decollator and the channel separation equipments 213 and 214, respectively, and a clock is separated. A clock decollator and the channel separation equipments 213 and 214 take a synchronization, and separate the data by which multiplex is carried out from the taken-out clock. The data on the separated channel pass along the selection synthesizer unit 210, and are inputted into a router 207.

[0089] The selection synthesizer unit 210 searched the connection in connection with a handover on the handover memory table 206, carried out selection composition of received data per wireless frame at the time of handover operation of the corresponding connection, and has acquired the cel diversity effectiveness. For details, it mentions later.

[0090] It judges whether a router 207 is the terminal with which the terminal of the partner who communicates has connected the data concerned to this system, and the terminal which must be connected also with it through the external communication network 101, if data are inputted. Here, if the data concerned are addressing to a terminal connected to this system, as it turns up here and being mentioned above, they will input into multicast equipment 205. On the other hand, in being the terminal which must be connected through the external communication network 101, it has set to the time stump decollator 204, and termination of the protocol of this system is carried out, and it performs conversion which united with the protocol of the external communication network 101 in the channel multiplexer 202.

[0091] (C-2) Explain the actuation of a going-down link when it is a base station get down actuation (C-2-1), and according to the link motion base station 103. An input of the data multiplex sent from MCC102 of a clock decollator and channel separation equipment 301 sets the clock inside a base station by the clock synchronizer 304 with reference to the clock which divided this into each channel and was separated further. A phase-locked loop circuit (it is called a "PLL circuit" Phase-Locked Loop Circuit and the following) is used for this. By existence of a PLL circuit, the clock of a base station 103 becomes possible [ the phase lag by transmission only existing as compared with the clock of MCC102, and having the same clock, consequently calculating the same time amount ].

[0092] The back time stump inputted into the time stump decollator 303 is separated, and the data outputted from a clock decollator and channel separation equipment 301 are sent to frame structure equipment and the offset compensator 306. Here, frame structure equipment and the offset compensator 306 constitute the data concerned on the frame which is the unit transmitted in the wireless section. As for the data constituted by the frame, convolutional-code-izing, an interleave, etc. are error-correcting-code--ization-processed in channel coding equipment 309. In addition, the data after this error correcting code-ized processing are diffused to diffusion bandwidth in the diffusion modulator 312. For example, if the symbol rate after an error correction is set to 64 [k symbols/s], this will be made into the signal of 4.096 [M chips/s] [MHz]5, i.e., a diffusion band, by being spread 64 times.

[0093] On the other hand, it is inputted into frame period generation equipment 307, counts about the clock separated in a clock decollator and channel separation equipment 301, and is used for count of a frame period. A pilot signal is generated by passing through suitable coding in this pilot coding equipment 310. This pilot signal is diffused to a diffusion band in the diffusion modulator 313. In the carrier modulator 315, addition composition is carried out with the user signal after other diffusion, a radio frequency becomes irregular further, and said diffused pilot signal and said diffused user signal are emitted from antenna equipment 317. That is, it is transmitted to the mobile station located in a cel.

[0094] (C-2-2) Explain going-up link motion, next the going-up link motion by the base station 103. If antenna equipment 317 receives the signal from two or more mobile stations by minding a wireless propagation path, a base station 103 will give this to the carrier demodulator 316, and will make it the signal of a diffusion band. Then, the signal to which it restored is given to the

rake receiving set 314, and the amendment and multi-pass composition of phase rotation by phasing are performed together with back-diffusion-of-electrons processing. This restores to the received signal to the signal of a baseband band.
[0095] Thus, in channel decryption equipment 311, error correction processing of day interleave processing, Viterbi decoding, etc. is performed by the signal to which it restored to a baseband band. Furthermore, the data after error correction processing termination are disassembled from a wireless frame in the frame decollator 308. Thereby, termination of the wireless interface is carried out.
[0096] the output data of the frame cracking unit 308 are inputted into the time stump additional equipment 305 — having — etc. — addition of the time stump for every data is made. Thus, the unit which adds a time stump is called a mini frame. For example, when the unit of a mini frame is 1 [ms] at the time of the data transmission of 32 [kbits/s], a time stump will be added to the user amount of data of 4[bytes]. By the channel multiplexer and clock insertion equipment 302, multiplex is carried out to other channels, a clock is inserted further, and the data with which the time stump was added are transmitted to MCC102.
[0097] (C-3) Explain actuation of the get-down-actuation (C-3-1), and according to link motion mobile station 107 going-down link reception in which it is a mobile station. The diffusion signal received with antenna equipment 401 through the wireless propagation path is inputted into the carrier demodulator 402, and it restores to it to the signal of a diffusion band. In the rake receiving set 404, the back diffusion of electrons of the diffusion band signal is carried out to the signal of a baseband band. The rake receiver 404 compounds the multi-pass produced by reflection of amendment of the phase rotation by phasing generated with migration of a mobile station, the building in a wireless propagation path, etc., and improves receiving gain.
[0098] In channel decryption equipment 406, error correction processing of a day interleave, Viterbi decoding, etc. is carried out by the baseband signaling outputted from the rake receiving set 404. In addition, further, it passes in the frame cracking unit 406, symbols, such as DDA, are removed, and it is taken out from the data after error correction processing as user data. This user data is changed into the condition that a user can recognize, in information source coding equipment (decoder) 412. For example, when the data which are a candidate for transmission are voice, the information source coding equipment 412 concerned is G729. By 32 k-ADPCM etc., the data by which voice coding was carried out are decoded and a sound signal is acquired.
[0099] (C-3-2) Explain going-up link motion, next actuation of the uphill link transmission by the mobile station 107. The information from a user is changed into digital data in information source coding equipment (encoder) 414. In addition, when the direct input of the digital signal is carried out from a user, this conversion actuation is not performed.
[0100] A digital signal is inputted into frame structure equipment 411, and can be carved into the data unit transmitted to a wireless propagation path. Furthermore, in channel coding equipment 408, to this data, error correcting code-ization of convolutional-code-izing, an interleave, etc. is performed, and it is spread to diffusion bandwidth with the diffusion modulator 405 to it. Further, in the carrier modulator 403, even a radio frequency band becomes irregular, and diffusion band data are emitted into a wireless propagation path through antenna equipment.
[0101] (D) Explain the procedure for carrying out a software handover in the conditions which will be the requisite of operation (D-1) concerning a software handover, next the CDMA communication system concerned.
[0102] Get down, in order that two base stations 103 and 104 and mobile stations 107 in the arrangement shown in drawing 1 may carry out a software handover, and in a link, that first, it is the need the base stations 103 and 104 which are carrying out clock subordination in MCC102 -- uniting the phase of each wireless frame 10 [ms] to transmit — And it is that the same information transmitted to each base station 103 and 104 is carried and transmitted to the wireless frame of this timing from MCCI02. And this needs to be carried out by low delay. At this time, the maximum ratio composition reception is realized in the rake receiving set 404 of a mobile station 107.
[0103] the frame to which it was transmitted in the mobile station 107 on the other hand in the uphill link that it is the need — base stations 103 and 104 — that result after each receiving and

performing error detection of a frame with a Cyclic Redundancy Check sign (it is called "CRC" CyclicRedundancy Check and the following) — 1 [bit] In adding as reliability information, and MCCI02, it is line trap ****** about selection composition based on this reliability information.
[0104] (D-2) Explain a series of actuation which gets down and is performed in a link motion going-down link using drawing 5 - drawing 9 . The actuation concerned which gets down and is performed in a link can be divided into the actuation (2nd actuation) which carries the same data in the transmission frame sent out from the actuation (1st actuation) which synchronizes the transmitting phase by which it is ** carried out in steps SP1 and SP2, and two or more base stations concerning the change of the communication link frame shown in steps SP3 and SP4.
[0105] First, the 1st actuation is explained using drawing 6 and drawing 7 . These drawing 6 and drawing 7 show the procedure in which a base station 104 unites a phase with the wireless frame of a base station 103 for the phase of the wireless frame. Each base stations 103 and 104 had frame period generation equipment 307 of a proper, respectively, with the frame phase generated in each, carried out the diffusion modulation of the pilot signal, and have transmitted it.
[0106] At the time of a setup of the call between a base station 103 and a mobile station 107, frame-structure equipment and the-offset-compensator 306-form the frame of User Information in accordance with the phase of the frame period generation equipment 307 of a base station 103. Like drawing 6 , in case a mobile station 107 is applied to operation of a handover, it measures the phase contrast of the pilot signal of a base station 103 and a base station 104, and notifies it to the base station 103 under communication link (step SP 1).
[0107] The pilot extractor 407 inputs the signal of the baseband band where the rake receiving set 404 in a mobile station 107 was first obtained in the diffusion band signal by performing the back diffusion of electrons with the diffusion sign of a pilot signal, and these actuation begins from taking out a pilot signal from here. After the phase of the taken-out pilot signal is measured in the frame phase measuring device 410, it is given to offset count equipment 413. This offset count equipment 413 calculates phase contrast from the measurement result of the phase of the pilot signal of a base station 103 inputted through this processing, and the phase of the pilot signal of a base station 104. Incidentally, the pilot extractor 407 consists of filters which remove the fluctuation of a high period by phasing using an integrating circuit. Moreover, offset is measured and calculated per diffusion modulation chip in the diffusion modulator 405 after this.
[0108] Thus, if the offset which exists between the base stations concerning a change is returned to a base station 103, next, it will shift to processing of a step SP 2. That is, as shown in drawing 7 , offset information is notified to a base station I04 via a base station 103 and MCC102. Here, it receives in the frame structure equipment and the offset compensator 306 in self-equipment, and a base station 104 transmits the user data with which only this offset amended the transmitting phase. The phase of the wireless frame of a base station 103 and a base station 104 is made in agreement by the above processing.
[0109] Next, the 2nd actuation is explained using drawing 8 . This drawing 8 is drawing which explains the approach of base stations 103 and 104 which constitutes a wireless frame, respectively. In addition, in drawing 8 , the unit to which the time stump is added, 1 [ i.e., ], [ms] is called a mini frame. Moreover, in this drawing 8 , the multiple address of the mini frame to which it was already decomposed into and the mini frame number was given by MCC102 shall be carried out to base stations 103 and 104 (step SP 3).
[0110] Now, in drawing 8 , since the base station 103 which is communicating through the communication channel actually delays the transmitted data by 1 mini frame, it operates so that a frame may be constituted. That is, the base station 103 of drawing 8 operates so that degree frame may not be constituted from a mini frame "5" which has already reached self-equipment but a frame may be constituted from a mini frame "4" which has arrived before 1 mini frame. This is for guaranteeing that the same information has reached the base station 104 concerning the handover point, i.e., the base station of drawing 8 .
[0111] Thus, if constituting a frame from a mini frame "4" is determined, the base station 103 concerned will notify the mini frame number which is the head of a frame to a base station 104 through MCC102 (step SP 4). On the other hand, a base station 104 constitutes a frame based on this notice, and transmission of the frame started from the same mini frame "4" as a base

station 103 is started at the time of initiation of a handover (step SP 5).
[0112] Diversity reception is realized in the rake receiving set 404 of a mobile station 107 by the generation of a wireless frame based on this offset amendment and a mini frame sequence number.
[0113] In addition, although explanation is omitted here, MCC102 has determined the base station used as the change timing of a communication channel, and the candidate for a change based on the information returned to a base station 103 from a mobile station 107. That is, since the mobile station 107 is always observing existence of the base station which is almost the same as the base station of the communication channel used for the current communication link, or can acquire the receive state beyond it, made the group a base station name (code) and its receive state and has returned this observation result with the receive state measuring device (the information about the base station under current and communication link is also included), it has determined the base station where MCC102 becomes a candidate for a change based on this information, and its change timing.
[0114] (D-2) Explain to the uphill link motion last a series of actuation performed in an uphill link using drawing 9-R> 9.-Drawing 9 expresses notionally actuation of the selection composition means 210 formed in the going-up link of MCCI02.
[0115] the wireless frame transmitted from the mobile station 107 — base stations 103 and 104 — pass addition of the reliability information on 1 [bit] on the frame which was alike, respectively, set and was received and which post-error detection was carried out and was reconfigurated — it is transmitted to MCCI02. This is realized by being added to that of a short cel at DDA.
[0116] MCC102 writes the connection number which minds a base station 103 from a mobile station 107 at the time of handover operation decision, and the connection number through a base station 104 in the handover memory table 206. MCCI02 — base stations 103 and 104 — respectively — since — the connection number of the data multiplexed is searched and the connection in connection with a handover is detected. The reliability information on the data of the 1st corresponding connection is checked, when you have no error, it adopts, and in with an error, waiting and the reliability information on the 2nd connection's data are checked for fixed time amount for the data of the 2nd connection of another side to arrive. When you have no error here, the 2nd connection's data are adopted.
[0117] Selection composition based on information is realized whenever [ reliability / in / as mentioned above / MCC102 ].
[0118] (E) the effectiveness realized by the CDMA communication system by the operation gestalt — the ** which a communication network 101, MCC102, base stations 103-105, and mobile stations 106-108 are alike, respectively, and does not hold a GPS receiver according to this operation gestalt as mentioned above — it can constitute — small [ of equipment ] — and low cost-ization is realizable.
[0119] Moreover, since a software handover is surely made, in the conventional system, failure of the software handover which existed can be lost and it becomes possible to perform voice communication and data communication good.
[0120] Furthermore, in the transmitted power control performed proper, it can be clear increase size in the number of mobile stations connectable with per one base station because the rate of the mobile station of the condition of a software handover increases.
[0121] (F) Although the case where prepared the function to guarantee the synchronization of a transmitting phase in the above-mentioned operation gestalt which are other operation gestalten to all a communication network 101, MCC102, the base stations 103-105, and mobile stations 106-108, and a GPS receiver was lost from a system was described, you may make it guarantee by the function by the GPS receiver as usual about this synchronous functional division. Even if such, since the identity of the transmit data transmitted from each base station is guaranteed by the above-mentioned time stump function, it can perform a positive software handover.
[0122] Moreover, in order to guarantee the identity of the contents of a frame transmitted between the base stations concerning a software handover in an above-mentioned operation gestalt at the time of software handover activation, the case where the initial data were notified

mutually was described, but also when not preparing the function for guaranteeing the identity of transmit data when there is no possibility that a gap may arise in the time of arrival of the multiple address data resulting from a transit delay etc., it can apply.

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[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the outline of the system configuration of the CDMA communication system concerning an operation gestalt.
[Drawing 2] It is the block diagram showing the configuration of MCC concerning an operation gestalt.
[Drawing 3] It is the block diagram showing the configuration of the base station concerning an operation gestalt.
[Drawing 4] It is the block diagram showing the configuration of the mobile station concerning an operation gestalt.
[Drawing 5] It is the flow chart which shows the communication channel change control procedure concerning an operation gestalt.
[Drawing 6] It is the explanatory view which presents explanation with detection and its notice of offset.
[Drawing 7] It is the explanatory view showing the situation of the amendment of a transmitting phase based on the notified offset.
[Drawing 8] It is the explanatory view showing the situation of an identity guarantee of the contents of transmit data between the base stations by the time stump.
[Drawing 9] It is the explanatory view showing the situation of the selection composition of an uphill frame based on reliability information.
[Description of Notations]
101 — A communication network, 102 — MCC (migration communications control station), 103, 104, 105 — Base station, 106, 107, 108 — A mobile station, 203 — Time stump additional equipment, 204 — A time stump decollator, 205 — Multicast equipment, 206 — Handover memory table, 210 — 211 A selection synthesizer unit, 212 — A channel multiplexer and clock insertion equipment, 213 214 — A clock decollator and channel separation equipment, 301 — A clock decollator and channel separation equipment, 302 — A channel multiplexer and clock insertion equipment, 303 — Time stump decollator, 305 [ — A rake receiving set, 413 / — Offset count equipment, 415 / — Receive state measuring device. ] — The time stump additional equipment, 306 — Frame structure equipment and an offset compensator, 314 — A rake receiving set, 404

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[Translation done.]

引用文献2

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(71)出願人　000000295
沖電気工業株式会社
東京都港区虎ノ門１丁目７番12号

(72)発明者　関根　清生
東京都港区虎ノ門１丁目７番12号　沖電気工業株式会社内

(72)発明者　川邉　学
東京都港区虎ノ門１丁目７番12号　沖電気工業株式会社内

(72)発明者　堀口　健治
東京都港区虎ノ門１丁目７番12号　沖電気工業株式会社内

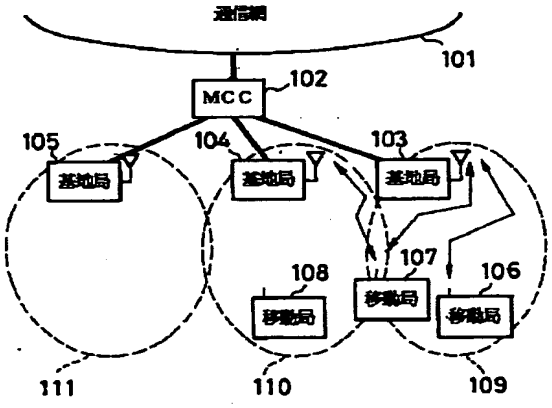
(74)代理人　弁理士　工藤　宣幸

(54)【発明の名称】　通信チャネル切替制御方法、移動通信制御局装置、基地局装置、移動局装置及び移動通信システム

(57)【要約】

【課題】　非同期基地局間においては、ソフトハンドオーバの保証が無かった。

【解決手段】　ある通信サービスエリア内に位置する移動局装置が、隣接する他の通信サービスエリアに移動する際に実行される通信チャネル切替制御方法に、移動対象である移動局装置が、現に通信チャネルを有する基地局装置から送信される伝送フレーム同期信号の送信位相と新たに通信チャネルの設定を予定する基地局装置から送信される伝送フレーム同期信号の送信位相との間に存在する送信位相差を検出し、当該位相差情報を、現に存在する通信チャネルを介して対応する基地局装置に通知する第１の処理と、通知を受けた基地局装置が、新たに通信チャネルの設定を予定する基地局装置に対し位相差情報を通知し、基地局装置から移動局装置に対して送信される予定の送信データの位相を補正する第２の処理とを備えるようにする。



【特許請求の範囲】

【請求項１】　ある通信サービスエリア内に位置する移動局装置が、隣接する他の通信サービスエリアに移動する際に実行される通信チャネル切替制御方法において、移動対象である移動局装置が、現に通信チャネルを有する基地局装置から送信される伝送フレーム同期信号の送信位相と新たに通信チャネルの設定を予定する基地局装置から送信される伝送フレーム同期信号の送信位相との間に存在する送信位相差を検出し、当該位相差情報を、現に存在する通信チャネルを介して対応する基地局装置に通知する第１の処理と、

上記通知を受けた基地局装置が、新たに通信チャネルの設定を予定する基地局装置に対し上記位相差情報を通知し、上記基地局装置から上記移動局装置に対して送信される予定の送信データの位相を補正する第２の処理とを備えることを特徴とする通信チャネル切替制御方法。

【請求項２】　ある通信サービスエリア内に位置する移動局装置が、隣接する他の通信サービスエリアに移動する際に実行される通信チャネル切替制御方法において、移動局装置との間に通信チャネルを設定し、通信データを送受する基地局装置を複数収容すると共に、複数の上記基地局装置と上記移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置が、通信チャネルの切替候補に係る複数の移動局装置に対して同一の通信データを同報する際、同報される通信データを、フレーム長に比較して短い単位時間間隔のデータに分解し、かつ、当該データのそれぞれに一意の識別符号を付加する第３の処理と、

現に通信チャネルを有する基地局装置が、新たに通信チャネルを設定する予定の基地局装置を考慮して決定した次フレーム周期の先頭データに対応する識別符号を、新たに通信チャネルを設定する予定の基地局装置に対して予め通知する第４の処理とを備えることを特徴とする通信チャネル切替制御方法。

【請求項３】　ある通信サービスエリア内に位置する移動局装置が、隣接する他の通信サービスエリアに移動する際に実行される通信チャネル切替制御方法において、

請求項１に記載の第１の処理と、

請求項１に記載の第２の処理と、

請求項２に記載の第３の処理と、

請求項２に記載の第４の処理とを備えることを特徴とする通信チャネル切替制御方法。

【請求項４】　ある通信サービスエリア内に位置する移動局装置が、隣接する他の通信サービスエリアに移動する際に実行される通信チャネル切替制御方法において、移動局装置との間に通信チャネルを設定し通信データを送受する基地局装置を複数収容すると共に、複数の上記基地局装置と上記移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置が、通信チャネルの切替時に、当該切替に係わる複数の基地局装置のそれぞれから、各装置が移動局装置より受信し復調した受信データを入力した場合、各基地局装置が当該受信データに付与した信頼度情報に基づいて複数の上記基地局装置から入力される受信データを選択的に合成する第５の処理を備えることを特徴とする通信チャネル切替制御方法。

【請求項５】　移動局装置との間に通信チャネルを設定し通信データを送受する基地局装置を複数収容すると共に、複数の上記基地局装置と上記移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置において、

移動対象である移動局装置が、現に通信チャネルを有する基地局装置と新たな通信チャネルの設定を予定する基地局装置との間に存在する送信位相差を検出し、現に存在する通信チャネルを介して対応する基地局装置に通知した位相差情報を、新たに通信チャネルの設定を予定する基地局装置に通知する送信位相差通知手段を備えることを特徴とする移動通信制御局装置。

【請求項６】　移動局装置との間に通信チャネルを設定し通信データを送受する基地局装置を複数収容すると共に、複数の上記基地局装置と上記移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置において、

上記移動局装置に対して送信される通信データを、フレーム長に比較して短い単位時間間隔のデータに分解し、かつ、当該データのそれぞれに一意の識別符号を付加する識別符号付加手段と、

上記通信チャネルの切替候補に係る複数の移動局装置に対して、上記識別符号の付された同一の通信データを同報する同報手段とを備えることを特徴とする移動通信制御局装置。

【請求項７】　収容される複数の上記基地局装置に対し、動作タイミングを指示する同一のクロックを供給するクロック供給手段を備えることを特徴とする請求項５又は６に記載の移動通信制御局装置。

【請求項８】　移動局装置との間に設定した通信チャネルを介して通信データを送受する基地局装置を複数収容すると共に、複数の上記基地局装置と上記移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置において、

請求項５に記載の送信位相差通知手段と、

請求項６に記載の識別符号付加手段と、

請求項６に記載の同報手段とを備えることを特徴とする移動通信制御局装置。

【請求項９】　移動局装置との間に通信チャネルを設定し通信データを送受する基地局装置を複数収容すると共に、複数の上記基地局装置と上記移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置において、

通信チャネルの切替時、当該通信チャネルの切替に係わ

る複数の基地局装置のそれぞれから、各装置が移動局装置より受信し復調した受信データを入力した場合、各基地局装置が当該受信データに付与した信頼度情報に基づいて当該複数の基地局装置から入力される受信データを選択的に合成する選択合成手段を備えることを特徴とする移動通信制御装置。

【請求項１０】　他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置において、

内部クロックに基づいて形成した伝送フレーム周期信号を、現に通信チャネルを有する移動局装置又はこれから通信チャネルの設定を予定する移動局装置に送信する同期信号送信手段と、

自装置の通信サービスエリア内に位置する移動局装置が、隣接する他の基地局装置が提供する通信サービスエリアに移動するのに伴い、当該移動に係る移動局装置から、新たに通信チャネルの設定を予定する他の基地局装置から受信した伝送フレーム同期信号と自装置から受信した伝送フレーム同期信号との間に存在する送信位相差が位相差情報として通知されて来た場合、隣接する他の基地局装置に対し、当該位相差情報を通知する送信位相差通知手段とを備えることを特徴とする基地局装置。

【請求項１１】　他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置において、

他の基地局装置から、これから新たに通信チャネルの設定を予定する移動局装置に対する自装置の伝送フレーム周期信号と現に通信チャネルが設定され通信が行われている他の基地局装置の伝送フレーム周期信号との間に存在する送信位相差が位相差情報として通知された場合、当該位相差情報に基づいて、新たに設定する通信チャネルの伝送フレーム同期信号の位相を補正する伝送フレーム位相補正手段を備えることを特徴とする基地局装置。

【請求項１２】　他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置において、

上記移動通信制御装置より通信チャネルの切替候補に宛てた同一の通信データの同報があった場合、自装置が現に当該通信チャネルの切替に係る移動局装置との間に通信チャネルを有する場合には、新たに通信チャネルを設定する基地局装置を考慮して決定した次フレーム周期の先頭データに対応する識別符号を、新たに通信チャネルの設定を予定する他の基地局装置に対して予め通知する識別符号通知手段を備えることを特徴とする基地局装置。

【請求項１３】　他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介し、それぞれ個別の通信データを送受する基地局装置において、

自装置がこれから通信チャネルの切替を行う移動局装置との間で現に通信チャネルを有する他の基地局装置から、当該装置が次フレームの先頭データに付されている識別符号の通知が受信された場合、上記移動通信制御装置から同報された通信データから当該識別符号に対応する通信データを識別し当該通信データを先頭データとして次の伝送フレームを生成する伝送フレーム生成手段を備えることを特徴とする基地局装置。

【請求項１４】　他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置において、

請求項１０に記載の同期信号送信手段と、

請求項１０に記載の送信位相差通知手段と、

請求項１１に記載の伝送フレーム位相補正手段と、

請求項１２に記載の識別符号通知手段と、

請求項１３に記載の伝送フレーム生成手段とを備えることを特徴とする基地局装置。

【請求項１５】　他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置において、

通信チャネルの切替時、移動局装置から受信し復調した受信データの信頼度を誤り検出結果に基づいて得る誤り検出手段と、

上記誤り検出手段により得られた信頼度を信頼度情報として上記受信データに付加し、自装置が収容される移動通信制御局装置に送出する信頼度情報付加手段とを備えることを特徴とする基地局装置。

【請求項１６】　自装置が位置する通信サービスエリアを管轄する基地局装置で通信チャネルを介して通信データを送受する移動局装置において、

現に通信チャネルを有する基地局装置から受信された伝送フレーム同期信号の送信位相と新たに通信チャネルの設定を予定する基地局装置から受信された伝送フレーム同期信号の送信位相との間に存在する送信位相差を検出する位相差検出手段と、

上記位相差検出手段により検出された送信位相差を位相差情報として、自装置との間に現に通信チャネルを有する基地局装置に通知する送信位相差通知手段とを備えることを特徴とする移動局装置。

【請求項１７】　自装置が位置する通信サービスエリアを管轄する基地局装置で通信チャネルを介して通信データを送受する移動局装置において、

現に通信チャネルを有する基地局装置から受信される受信信号と新たに通信チャネルの設定が予定される基地局装置から受信される受信信号を合成受信し復調する受信信号復調手段を備えることを特徴とする請求項１６に記

載の移動局装置。
【請求項１８】　現に通信チャネルを有する基地局装置を含む複数の基地局装置から受信された受信信号それぞれについて受信状態を測定する受信状態測定手段と、
上記受信状態測定手段により測定された各基地局装置に対する受信状態を受信状態情報として、自装置との間に現に通信チャネルを有する基地局装置に通知する受信状態通知手段とを備えることを特徴とする請求項１６又は１７に記載の基地局装置。
【請求項１９】　通信網に接続された少なくとも１つの、請求項５～９のいずれかに記載の移動通信制御局装置と、
上記移動通信制御局装置に接続された複数の、請求項１０～１５のいずれかに記載の基地局装置と、
上記複数の基地局装置のうち少なくとも１つに接続された複数の、請求項１６～１８のいずれかに記載の移動局装置とを備えることを特徴とする移動通信システム。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は移動通信システムに関し、例えば、パーソナル通信システム（Personal Communication Services、以下「ＰＣＳ」という）やディジタルセルラのように、アクセス方式として符号分割多重アクセス（Code Division Multi Access、以下「ＣＤＭＡ」という）方式を用いる移動通信システムに適用し得る。また、本発明は、かかる移動通信システムを構成する各構成要素としての移動局装置、基地局装置及び上位の移動通信制御局（Mobile Communication Control Center、以下「ＭＣＣ」という）装置に関するものである。さらに、本発明は、かかる移動通信システムにおいて使用する通信チャネル切替制御方法に関するものである。
【０００２】
【従来の技術】従来のＣＤＭＡ通信システムついて記述した文献として、例えば、下記文献がある。文献：“Mobile Station-Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular System, ＴＩＡ／ＥＩＡ／ＩＳ－９５, July 1993, U.S.A.,”この文献には、ＣＤＭＡ通信システムを構築する移動局と基地局間を接続する無線インターフェースについての米国標準方式が記述されている。
【０００３】かかる従来のＣＤＭＡ通信システムにおいては、ＭＣＣと各基地局間を接続する伝送路を、同期ディジタルハイアラーキ（Synchronous Digital Hierarchy、以下「ＳＤＨ」という）にて規定し、ＳＤＨにおいて規定された伝送速度で情報を伝送する構成となっている。なお、ＭＣＣは、当該伝送路を時分割多重することにより、各基地局の通信サービスエリア内に存在する複数の移動局に関するユーザ情報（音声情報、コンピュータデータその他の情報を含む）と制御情報を伝送している。
【０００４】また、かかる従来のＣＤＭＡ通信システムにおいては、移動局、基地局及びＭＣＣの全てが、グローバル・ポジショニング・システム（以下「ＧＰＳ」という）の受信器を保持しており、当該通信システムを構成する各装置が絶対時刻をもち互いに同期した状態で動作している。このため、基地局から移動局への下りリンクを通信中であるある基地局から他の基地局に切り替える場合にも、複数の基地局から同一の情報を同期した状態で送信することが可能となり、移動局側において最大比合成ダイバーシチ受信ができるようになっている。これにより、下りリンク切替時においても、信号にとぎれが出ないようになっている。これをソフトハンドオーバという。
【０００５】また、他のユーザの通信の干渉低減のために送信電力制御を行うＣＤＭＡ通信では、ソフトハンドオーバを実施してセルダイバーシチを利用することで、送信電力の低減を可能とし、１基地局当たりの接続可能な移動局の数を増加でき、システム全体の通信効率を向上できるようになっている。
【０００６】
【発明が解決しようとする課題】しかしながら、上記文献に記述された標準方式に基づく従来装置においては、ソフトハンドオーバを実施するために求められる条件として、ＭＣＣがある時刻に送信した情報が既に移動局との間で通信中の基地局に届くのに要する時間に比して、新たに移動局との通信に加わろうとする基地局に対してＭＣＣからマルチキャスト送信された同様の情報が届くのに要する時間が短くならねばならなかった。
【０００７】これは、音声のように連続する情報を伝送する際、既に接続されている基地局との間に設けられているリンクを保持しなければならないためである。すなわち、新たに接続を行う基地局から移動局に形成するリンクは、現に保持されているリンクに同期して情報を伝送しなければならず、同期をとらなければならない側の基地局に情報が届いていないとすると、ソフトハンドオーバが実施できなくなるためである。従って、かかるソフトハンドオーバが実現できない場合には、音声等の連続データを受信する移動局側において、情報の流れが寸断される切換が実施されることになる。以下これを、情報系列無瞬断のソフトハンドオーバと比較して、ハードハンドオーバという。
【０００８】かかるソフトハンドオーバの条件が満たされなくなる確率は、ＭＣＣから各基地局への伝送路の距離にばらつきがある場合に高くなってしまう。そこで、無線インターフェースの伝送単位の先頭をＭＣＣから各基地局に通知するようにし、各基地局では緩衝のための一定時間の遅延を挿入することにより、ソフトハンドオーバの条件を緩和する手法がとられているが、必ずソフトハンドオーバが実施される保証は無かった。また、シ

ステム同期を実現させるために、移動局がＧＰＳ受信器を保持しなければならないのは、端末を廉価に構成する上で、制約になっていた。

【０００９】

【課題を解決するための手段】かかる課題を解決するため、各発明においては、それぞれ以下の処理又は手段を備えることを特徴とする。

【００１０】(A-1) まず、第１の発明においては、ある通信サービスエリア内に位置する移動局装置が、隣接する他の通信サービスエリアに移動する際に実行される通信チャネル切替制御方法において、以下の処理手順を備えることを特徴とする。

【００１１】すなわち、(1) 移動対象である移動局装置が、現に通信チャネルを有する基地局装置から送信される伝送フレーム同期信号の送信位相と新たに通信チャネルの設定を予定する基地局装置から送信される伝送フレーム同期信号の送信位相との間に存在する送信位相差を検出し、当該位相差情報を、現に存在する通信チャネルを介して対応する基地局装置に通知する第１の処理と、(2) 通知を受けた基地局装置が、新たに通信チャネルの設定を予定する基地局装置に対し位相差情報を通知し、基地局装置から移動局装置に対して送信される予定の送信データの位相を補正する第２の処理とを備えることを特徴とする。

【００１２】(A-2) このように、第１の発明においては、現に移動局装置との間に通信チャネルを有する基地局装置から送信される伝送フレーム同期信号と、新たに通信チャネルの設定を予定する基地局装置から送信される伝送フレーム同期信号との間に存在する送信位相差を、移動局装置から通知される位相差情報に基づいて補正する構成としたことにより、各基地局装置が互いに独立したクロックで動作している場合であっても、切替時に両基地局装置から送出される伝送フレームの位相同期を保証することができる。これにより、移動通信システムを構成する各装置にＧＰＳ受信機を搭載する必要を無くすことが可能となる。

【００１３】(B-1) また、第２の発明においては、ある通信サービスエリア内に位置する移動局装置が、隣接する他の通信サービスエリアに移動する際に実行される通信チャネル切替制御方法において、以下の処理手順を備えることを特徴とする。

【００１４】すなわち、(1) 移動局装置との間に通信チャネルを設定し、通信データを送受する基地局装置を複数収容すると共に、複数の基地局装置と移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置が、通信チャネルの切替候補に係る複数の移動局装置に対して同一の通信データを同報する際、同報される通信データを、フレーム長に比較して短い単位時間間隔のデータに分解し、かつ、当該データのそれぞれに一意の識別符号を付加する第３の処理と、(2) 現に通信チャネルを有する基地局装置が、新たに通信チャネルを設定する予定の基地局装置を考慮して決定した次フレーム周期の先頭データに対応する識別符号を、新たに通信チャネルを設定する予定の基地局装置に対して予め通知する第４の処理とを備えることを特徴とする。

【００１５】(B-2) このように、第２の発明においては、実際に通信データを送信する基地局装置が、切替に係る他の基地局装置を考慮して決定した次フレーム周期の先頭データに対応する識別符号を、当該切替に係る基地局装置に予め通知する構成としたことにより、当該切替に係る基地局装置から切替時に同時送信される伝送フレームの情報の同一性を保証することができる。これにより、確実なソフトハンドオーバを保証することができる。また、先頭データを一致させるために必要とされる遅延時間は、フレーム長に比較して短い単位時間間隔を表す識別符号にて細かく設定できるため、必要最小限の遅延にてソフトハンドオーバ処理を実行できる。

【００１６】(C) さらに、第３の発明においては、ある通信サービスエリア内に位置する移動局装置が、隣接する他の通信サービスエリアに移動する際に実行される通信チャネル切替制御方法において、以下の処理手順を備えることを特徴とする。

【００１７】すなわち、(1) 請求項１に記載の第１の処理と、(2) 請求項１に記載の第２の処理と、(3) 請求項２に記載の第３の処理と、(4) 請求項２に記載の第４の処理とを備えることを特徴とする。

【００１８】このように、第３の発明においては、通信チャネル切替制御方法に上記(1)～(4)の各処理を設けたことにより、各基地局装置が互いに独立したクロックで動作している場合であっても、切替時に両基地局装置から送出される伝送フレームの位相同期を保証することができ、しかも、ソフトハンドオーバの失敗のおそれも無くすことができる。

【００１９】(D-1) さらに、第４の発明においては、ある通信サービスエリア内に位置する移動局装置が、隣接する他の通信サービスエリアに移動する際に実行される通信チャネル切替制御方法において、以下の処理手順を備えることを特徴とする。

【００２０】すなわち、移動局装置との間に通信チャネルを設定し通信データを送受する基地局装置を複数収容すると共に、複数の基地局装置と移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置が、通信チャネルの切替時に、当該切替に係わる複数の基地局装置のそれぞれから、各装置が移動局装置より受信し復調した受信データを入力した場合、各基地局装置が当該受信データに付与した信頼度情報に基づいて複数の基地局装置から入力される受信データを選択的に合成する第５の処理を備えることを特徴とする。

【００２１】(D-2) このように、第４の発明においては、複数の基地局装置のそれぞれが移動局装置から受信

した上り通信データを、その信頼度情報に基づいて選択的に合成する構成としたことにより、ソフトハンドオーバの際に受信された受信データの信頼性を高めることができる。

【００２２】(E-1) また、第５の発明においては、移動局装置との間に通信チャネルを設定し通信データを送受する基地局装置を複数収容すると共に、複数の基地局装置と移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置において、以下の手段を備えることを特徴とする。

【００２３】すなわち、移動対象である移動局装置が、現に通信チャネルを有する基地局装置と新たな通信チャネルの設定を予定する基地局装置との間に存在する送信位相差を検出し、現に存在する通信チャネルを介して対応する基地局装置に通知した位相差情報を、新たに通信チャネルの設定を予定する基地局装置に通知する送信位相差通知手段を備えることを特徴とする。

【００２４】(E-2)　このように、第５の発明においては、通信チャネルの切替を管理制御する移動通信制御装置に送信位相差通知手段を設け、実際に通信チャネルの切替が実行される前に、当該切替に係る基地局装置間に存在する送信位相差を通知するようにしたことにより、これら基地局装置がそれぞれ独立したクロックにて動作している場合にも、各基地局装置から送信される通信データの送信位相を一致させることが可能となる。

【００２５】(F-1) さらに、第６の発明においては、移動局装置との間に通信チャネルを設定し通信データを送受する基地局装置を複数収容すると共に、複数の基地局装置と移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置において、以下の手段を備えることを特徴とする。

【００２６】すなわち、(1) 移動局装置に対して送信される通信データを、フレーム長に比較して短い単位時間間隔のデータに分解し、かつ、当該データのそれぞれに一意の識別符号を付加する識別符号付加手段と、(2) 通信チャネルの切替候補に係る複数の移動局装置に対して、識別符号の付された同一の通信データを同報する同報手段とを備えることを特徴とする。

【００２７】(F-2)　このように、第６の発明においては、通信チャネルの切替を管理制御する移動通信制御装置に識別符号付加手段と同報手段とを設け、通信データをフレーム長に比較して短い単位時間間隔に分解し、これに一意の識別符号を付して通信チャネルの切替に係る基地局装置に同報するようにしたことにより、当該識別符号を基準に複数の基地局装置において生成される伝送フレームの同一性を保証することが可能となる。また、その処理を最小限度の遅延時間で実現できる。これにより、確実なソフトハンドオーバが保証される。

【００２８】(G) さらに、第７の発明においては、移動局装置との間に設定した通信チャネルを介して通信データを送受する基地局装置を複数収容すると共に、複数の基地局装置と移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置において、以下の手段を備えることを特徴とする。

【００２９】すなわち、(1) 請求項５に記載の送信位相差通知手段と、(2) 請求項６に記載の識別符号付加手段と、(3) 請求項６に記載の同報手段とを備えることを特徴とする。

【００３０】このように、第７の発明においては、通信チャネルの切替を管理制御する移動通信制御装置に上記(1) ～(3) に示す各手段を設けたことにより、各基地局装置が互いに独立したクロックで動作している場合であっても、切替時に両基地局装置から送出される伝送フレームの位相同期を保証することができ、しかも、ソフトハンドオーバの失敗のおそれも無くすことができる。

【００３１】(H-1) さらに、第８の発明においては、移動局装置との間に通信チャネルを設定し通信データを送受する基地局装置を複数収容すると共に、複数の上記基地局装置と上記移動局装置との間で実行される通信チャネルの切替を管理制御する移動通信制御局装置において、以下の手段を備えることを特徴とする。

【００３２】すなわち、通信チャネルの切替時、当該通信チャネルの切替に係わる複数の基地局装置のそれぞれから、各装置が移動局装置より受信し復調した受信データを入力した場合、各基地局装置が当該受信データに付与した信頼度情報に基づいて当該複数の基地局装置から入力される受信データを選択的に合成する選択合成手段を備えることを特徴とする。

【００３３】(H-2)　このように、第８の発明においては、通信チャネルの切替を管理制御する移動通信制御装置に選択合成手段を設け、現に通信チャネルを有する基地局装置から受信された受信データだけでなく、他の基地局装置において受信された受信データも選択的に合成して上りの受信データとすることにより、ソフトハンドオーバの際に受信された受信データの信頼性を高めることができる。

【００３４】(I-1) また、第９の発明においては、他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置において、以下の手段を備えることを特徴とする。

【００３５】すなわち、(1) 内部クロックに基づいて形成した伝送フレーム周期信号を、現に通信チャネルを有する移動局装置又はこれから通信チャネルの設定を予定する移動局装置に送信する同期信号送信手段と、(2) 自装置の通信サービスエリア内に位置する移動局装置が、隣接する他の基地局装置が提供する通信サービスエリアに移動するのに伴い、当該移動に係る移動局装置から、新たに通信チャネルの設定を予定する他の基地局装置か

ら受信した伝送フレーム同期信号と自装置から受信した伝送フレーム同期信号との間に存在する送信位相差が位相差情報として通知されて来た場合、隣接する他の基地局装置に対し、当該位相差情報を通知する送信位相差通知手段とを備えることを特徴とする。

【００３６】(I-2)　このように、第９の発明においては、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置に同期信号送信手段と送信位相差通知手段とを設けたことにより、自装置を含め通信チャネルの切替に係る基地局装置間に存在する送信位相差を移動局装置を介して認識できると共に、他方の基地局装置への通知により自他装置間における送信位相差を無くすことが可能となる。

【００３７】(J-1) また、第１０の発明においては、他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置において、以下の手段を備えることを特徴とする。

【００３８】すなわち、他の基地局装置から、これから新たに通信チャネルの設定を予定する移動局装置に対する自装置の伝送フレーム周期信号と現に通信チャネルが設定され通信が行われている他の基地局装置の伝送フレーム周期信号との間に存在する送信位相差が位相差情報として通知された場合、当該位相差情報に基づいて、新たに設定する通信チャネルの伝送フレーム同期信号の位相を補正する伝送フレーム位相補正手段を備えることを特徴とする。

【００３９】(J-2)　このように、第１０の発明においては、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置に伝送フレーム位相補正手段を設け、通知された位相差情報に基づいて自装置の送信位相を補正できるようにしたことにより、ソフトハンドオーバに係る他の基地局装置との同期を確立できる。

【００４０】(K-1) さらに、第１１の発明においては、他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置において、以下の手段を備えることを特徴とする。

【００４１】すなわち、(1) 移動通信制御装置より通信チャネルの切替候補に宛てた同一の通信データの同報があった場合、自装置が現に当該通信チャネルの切替に係る移動局装置との間に通信チャネルを有する場合には、新たに通信チャネルを設定する予定の基地局装置を考慮して決定した次フレーム周期の先頭データに対応する識別符号を、新たに通信チャネルの設定を予定する他の基地局装置に対して予め通知する識別符号通知手段を備えたことを特徴とする。

【００４２】(K-2)　このように、第１１の発明においては、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置に識別符号通知手段を設けたことにより、ソフトハンドオーバの際に通信チャネルの切替に係る複数の基地局装置から送信される伝送フレームのデータ内容の同一性を保証できる。

【００４３】(L-1) さらに、第１２の発明においては、他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介し、それぞれ個別の通信データを送受する基地局装置において、以下の手段を備えることを特徴とする。

【００４４】すなわち、自装置がこれから通信チャネルの切替を行う移動局装置との間で現に通信チャネルを有する他の基地局装置から、当該装置が次フレームの先頭データに付されている識別符号の通知が受信された場合、移動通信制御装置から同報された通信データから当該識別符号に対応する通信データを識別し当該通信データを先頭データとして次の伝送フレームを生成する伝送フレーム生成手段を備えることを特徴とする。

【００４５】(L-2)　このように、第１２の発明においては、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置に伝送フレーム生成手段を設けたことにより、ソフトハンドオーバの際に通信チャネルの切替に係る複数の基地局装置から送信される伝送フレームのデータ内容の同一性を保証できる。

【００４６】(M) さらに、第１３の発明においては、他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置において、以下の手段を備えることを特徴とする。

【００４７】すなわち、(1) 請求項１０に記載の同期信号送信手段と、(2) 請求項１０に記載の送信位相差通知手段と、(3) 請求項１１に記載の伝送フレーム位相補正手段と、(4) 請求項１２に記載の識別符号通知手段と、(5) 請求項１３に記載の伝送フレーム生成手段とを備えたことを特徴とする。

【００４８】このように、第１３の発明においては、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置に上記(1) ～(5) に示す各手段を設けたことにより、各基地局装置が互いに独立したクロックで動作している場合であっても、切替時に両基地局装置から送出される伝送フレームの位相同期を保証することができ、しかも、ソフトハンドオーバの失敗のおそれも無くすことができる。

【００４９】(N-1) さらに、第１４の発明においては、他の基地局装置と共に移動通信制御局装置に収容され、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置において、以下の手段を備えることを特徴とする。

【００５０】すなわち、(1) 通信チャネルの切替時、移動局装置から受信し復調した受信データの信頼度を誤り検出結果に基づいて得る誤り検出手段と、(2) 誤り検出手段により得られた信頼度を信頼度情報として受信データに付加し、自装置が収容される移動通信制御局装置に送出する信頼度情報付加手段とを備えることを特徴とする。

【００５１】(N-2) このように、第１４の発明においては、１又は複数の移動局装置それぞれとの間に設定された個別の通信チャネルを介してそれぞれ個別の通信データを送受する基地局装置に誤り検出手段と信頼度情報付加手段とを設けたことにより、自装置が移動局装置から受信した受信データを処理する移動通信制御装置に自装置から送られる受信データの信頼度を通知することができる。これにより、ソフトハンドオーバ実行時における上り受信データの信頼性をシステム全体として高めることができる。

【００５２】(O-1) 第１５の発明においては、自装置が位置する通信サービスエリアを管轄する基地局装置で通信チャネルを介して通信データを送受する移動局装置において、以下の手段を備えることを特徴とする。

【００５３】すなわち、(1) 現に通信チャネルを有する基地局装置から受信された伝送フレーム同期信号の送信位相と新たに通信チャネルの設定を予定する基地局装置から受信された伝送フレーム同期信号の送信位相との間に存在する送信位相差を検出する位相差検出手段と、(2) 位相差検出手段により検出された送信位相差を位相差情報として、自装置との間に現に通信チャネルを有する基地局装置に通知する送信位相差通知手段とを備えることを特徴とする。

【００５４】(O-2) このように、第１５の発明においては、移動局装置に位相差検出手段と送信位相差通知手段とを設け、通信チャネルの切替に係る基地局装置間に存在する送信位相差を基地局装置側に通知するようにしたことにより、各基地局装置が独立したクロックで動作している場合にも、その送信位相を一致させることを可能にできる。これにより、移動局装置や基地局装置からＧＰＳ受信機を無くすことができる。

【００５５】(P-1) 第１６の発明においては、移動通信システムを、(1) 通信網に接続された少なくとも１つの、請求項５～９のいずれかに記載の移動通信制御局装置と、(2) 移動通信制御局装置に接続された複数の、請求項１０～１５のいずれかに記載の基地局装置と、(3) 複数の基地局装置のうち少なくとも１つに接続された複数の、請求項１６～１８のいずれかに記載の移動局装置とを備えることを特徴とする。

【００５６】このように、第１６の発明においては、移動通信システムに上記(1) ～(3) に示す各手段を設けたことにより、ソフトハンドオーバを確実に実行でき、しかも、ＧＰＳ受信機等の必要性も無くし得る簡易かつ経済的なシステムを構成することができる。

【００５７】

【発明の実施の形態】以下、本発明を、ＣＤＭＡ通信システムに適用した実施形態を図面を参照しながら説明する。

【００５８】（Ａ）実施形態に係るＣＤＭＡ通信システムの全体構成

図１は、実施形態に係るＣＤＭＡ通信システムの接続形態を示す概念図である。図１に示すＣＤＭＡ通信システムは、通信網１０１に接続された１台の移動通信制御局（すなわち、ＭＣＣ）１０２と、これに有線路を介して接続され収容された３台の基地局１０３～１０５と、これら基地局のうち少なくともいずれかと無線伝搬路を設定しユーザデータを通信する３台の移動局１０６～１０８とによって構成されている。なお、図１においては、各基地局１０３～１０５によって提供される通信サービスエリア（セル）１０９～１１１を波線にて示している。

【００５９】このうち、ＭＣＣ１０２と通信網１０１とは、ＳＤＨで規定されている適当な伝送路インターフェースをもって接続されている。なお、通信網１０１とＭＣＣ１０２間の伝送・交換形態は、非同期転送モード（Asynchronous Transfer Mode、以下「ＡＴＭ」という）であっても、同期転送モード（Synchronous TransferMode、以下「ＳＴＭ」という）であっても良い。

【００６０】また、各基地局１０３～１０５とＭＣＣ１０２とは、いずれもＳＤＨで規定されている適当な伝送路インターフェースをもって接続されている。なお、ＭＣＣ１０２と各基地局１０３～１０５間での伝送・交換形態は、ＡＴＭでもＳＴＭでも良いが、ＡＴＭで接続される場合には、各基地局におけるインターフェースとして、下り回線にＡＴＭ－ＳＴＭ変換装置が、上り回線にＳＴＭ－ＡＴＭ変換装置が必要になる。

【００６１】さらに、各移動局１０６～１０８と各基地局１０３～１０５とは、それぞれ次のように通信を行っている。例えば、移動局１０６は基地局１０３と通信しており、移動局１０７は基地局１０３及び基地局１０４と同時に通信している。また、移動局１０８はいずれの基地局とも通信していない。なお、各移動局１０６～１０８は、各基地局から無線伝搬路を介して受信した受信信号のうち最良の受信状態が得られる基地局との間で通信を行う。従って、セルからセルへの移動に伴い基地局の切換を実施する。このように、移動局が切換時に複数の基地局と通信することをハンドオーバという。図１の

場合、移動局１０７の状態がハンドオーバである。なお、移動局が複数の基地局と同時に通信することによってセルダイバーシチ効果が得られ、送信電力が低減され、他局へ与える干渉を抑制することが可能となる。

【００６２】また、これら移動局１０６～１０８は、少なくとも１つ以上の基地局、ＭＣＣ１０２及び通信網１０１を介して他の端末と、又は、ＭＣＣ１０２に収容されている１つ以上の基地局を再び介して同一のシステム内に属する他の移動局と通信を行う。

【００６３】（Ｂ）ＣＤＭＡ通信システムを構成する各部の構成

（Ｂ－１）ＭＣＣの構成

図２は、本実施形態に係るＣＤＭＡ通信システムのうちＭＣＣ１０２の内部構成を示すブロック図である。なお、接続関係は、図１と同じである。すなわち、ＭＣＣ１０２は、通信網１０１、基地局１０３及び基地局１０４と接続されている。ただし、基地局１０５との接続は、図２の場合、省略している。

【００６４】図２に示すように、ＭＣＣ１０２は、チャネル分離装置２０１、チャネル多重装置２０２、タイムスタンプ付加装置２０３、タイムスタンプ分離装置２０４、マルチキャスト装置２０５、ハンドオーバメモリテーブル２０６、経路選択装置２０７、２０８、クロック生成装置２０９、選択合成装置２１０、チャネル多重装置及びクロック挿入装置２１１、２１２、チャネル分離装置及びクロック分離装置２１３、２１４からなる。

【００６５】このうち、経路選択装置２０７、２０８及びマルチキャスト装置２０５が、現に通信チャネルを有する基地局から新たに通信チャネルの設定を予定する基地局装置に宛てて送出された位相差情報を折り返す機能、すなわち請求項５における送信位相差通知手段に当たる。

【００６６】また、タイムスタンプ付加装置２０３が、通信データをフレーム長に比較して短い単位時間間隔に分解し、一意の識別符号を付加する機能、すなわち請求項６の識別符号付加手段に当たる。マルチキャスト装置２０５は、同じく、請求項６の同報手段に当たる。

【００６７】さらに、選択合成装置２１０が、複数の基地局がそれぞれ受信し復調した同一移動局からの受信データをその信頼度情報に基づいて選択的に合成する機能、すなわち請求項９の選択合成手段に当たる。

【００６８】なお、このＭＣＣ１０２が、各移動局と基地局とのハンドオーバを管理しており、移動局から通知された各基地局間の受信状態情報（各基地局名（コード）とその受信状態（受信電力、受信ＳＮ比その他の状態を含む）の組でなる情報）と、各基地局のトラフィックに基づいて、ハンドオーバに係る基地局を決定する。

【００６９】（Ｂ－２）基地局の構成

図３は、本実施形態に係るＣＤＭＡ通信システムのうち基地局１０３の内部構成を示すブロック図である。なお、基地局１０４及び基地局１０５も基地局１０３と同様の構成からなる。

【００７０】図３に示すように、基地局１０３は、クロック分離装置及びチャネル分離装置３０１、チャネル多重装置及びクロック挿入装置３０２、タイムスタンプ分離装置３０３、クロック同期装置３０４、タイムスタンプ付加装置３０５、フレーム構成装置及びオフセット補正装置３０６、フレーム周期生成装置３０７、フレーム分解装置３０８、チャネル符号化装置３０９、パイロット符号化装置３１０、チャネル復号化装置３１１、拡散変調装置３１２、拡散変調装置３１３、レイク受信装置３１４、キャリア変調装置３１５、キャリア復調装置３１６、アンテナ装置３１７からなる。

【００７１】このうち、受信系列を構成する各装置が、移動局から通知されてきた基地局間の送信位相差を転送する機能、すなわち請求項１０の送信位相差通知手段に当たる。

【００７２】また、チャネル復号化装置３１１が、移動局から受信し復調した受信データの信頼度を誤り検出結果から得る機能と、得られた信頼度を信頼度情報として移動通信制御局に送出する機能、すなわち、請求項１５の誤り検出手段及び信頼度情報付加手段に当たる。

【００７３】さらに、フレーム構成装置及びオフセット補正装置３０６が、他の基地局を介して移動局より通知された基地局間の送信位相差を補正する機能、すなわち請求項１１の伝送フレーム位相補正手段に当たる。なお、このフレーム構成装置及びオフセット補正装置３０６は、この他にも、現に移動局との間に通信チャネルを有する場合に、次フレーム周期の先頭データに定めと共にこれを識別する識別符号を他の基地局に通知する機能、すなわち請求項１２の識別符号通知手段に当たる。さらに、このフレーム構成装置及びオフセット補正装置３０６は、新たに移動局との間に通信チャネルを設定する予定である場合に、現に通信チャネルを有する基地局より通知された識別符号に基づいて次フレームを生成する機能、すなわち請求項１３の伝送フレーム生成手段に当たる。

【００７４】（Ｂ－３）移動局の構成

図４は、本実施形態に係るＣＤＭＡ通信システムのうち移動局１０７の内部構成を示すブロック図である。なお、移動局１０６及び移動局１０８も移動局１０７と同様の構成からなる。

【００７５】図４に示すように、移動局１０７は、アンテナ装置４０１、キャリア復調装置４０２、キャリア変調装置４０３、レイク受信装置４０４、拡散変調装置４０５、チャネル復号化装置４０６、パイロット抽出装置４０７、チャネル符号化装置４０８、フレーム分解装置４０９、フレーム位相測定装置４１０、フレーム構成装置４１１、情報源符号化装置（復号器）４１２、オフセット計算装置４１３、情報源符号化装置（符号器）４１

４、受信状態測定装置４１５からなる。

【００７６】このうち、オフセット計算装置４１３が、複数の基地局間に存在する送信位相の位相差を検出する機能、すなわち請求項１６の位相差検出手段に当たる。

【００７７】また、フレーム構成装置４１１が、検出された位相差情報を基地局に通知する機能、すなわち請求項１６の送信位相差通知手段に当たる。

【００７８】さらに、レイク受信装置４０４が、複数の基地局から受信された受信信号を合成し復調する機能、すなわち請求項１７の受信信号復調手段に当たる。

【００７９】さらに、受信状態測定装置４１５が、複数の基地局から受信された受信信号それぞれについての受信状態（受信ＳＮ比や受信電力）を測定する機能、すなわち請求項１８の受信状態測定手段に当たる。

【００８０】なお、フレーム構成装置４１１は、測定された受信状態を受信状態情報として基地局に通知する機能、すなわち請求項１８の受信状態通知手段にも当たる。

【００８１】（Ｃ）実施形態に係るＣＤＭＡ通信システムにおいて実行される通信動作

まず最初に、各装置による、下りリンク及び上りリンクのデータの流れを説明する。

【００８２】（Ｃ－１）ＭＣＣの動作

（Ｃ－１－１）下りリンク動作

ＭＣＣ１０２の下りリンク動作を説明する。本システムの外部に位置する通信網１０１においては、端末間の複数コネクションのデータが時分割多重されて伝送され、これがＭＣＣ１０２に送られる。ＭＣＣ１０２は、時分割多重されて伝送されて来たデータをチャネル分離装置２０１に入力すると、これを各チャネルに分離する。分離されたデータは、タイムスタンプ付加装置２０３に入力され、さらに一定データ量毎にタイムスタンプが付加される。

【００８３】例えば、１つのＡＴＭセルを複数の通信コネクションで共有するレイヤード化においては、ショートセルが用いられる。そのショートセルには、コネクション毎に等しいデータ量に対してシーケンス番号が付加される。このシーケンス番号を、タイムスタンプとして実現する。このタイムスタンプは、基地局と移動局間の無線フレーム１０［ms］の周期でリセットされ巡回される。

【００８４】なお、チャネル分離装置２０１及びタイムスタンプ付加装置２０３のそれぞれにおいては、外部通信網のデータリンク層のプロトコルが終端され、本システムのデータリンク層のプロトコルが実施されている。

【００８５】このようにしてタイムスタンプが付加されたデータは、マルチキャスト装置２０５に入力される。また、このマルチキャスト装置２０５には、本システム内にある端末間同士で送受される通信データが、経路選択装置２０７で折り返された後入力される。

【００８６】マルチキャスト装置２０５は、基地局間ハンドオーバを実施するコネクションをハンドオーバメモリテーブル２０５を検索することで認識し、該当するコネクションに対してデータのマルチキャストを実施し、それぞれのデータを経路選択装置２０８に渡す。ここで、経路選択装置２０８は、基地局間ハンドオーバに関わる複数の基地局に対し、マルチキャストされたデータを振り分ける。ただし、基地局間ハンドオーバに関わらないコネクションのデータの場合には、当該マルチキャスト装置２０５はマルチキャストを実行せず、そのまま、経路選択装置２０８に渡す。

【００８７】チャネル多重装置及びクロック挿入装置２１１、２１２は、１つ以上のコネクションのデータを入力し、それらを多重して基地局１０３及び１０４のそれぞれに送信する。ここで、クロック生成装置２０９より入力されたクロックが同期信号として挿入される。例えば、伝送速度が1.544［Mbits／s］の場合、8［kbits／s］のクロックが挿入される。

【００８８】（Ｃ－１－２）上りリンク動作

次に、ＭＣＣ１０２における上りリンクの動作を説明する。基地局１０３及び１０４から伝送されてきた多重データは、それぞれクロック分離装置及びチャネル分離装置２１３及び２１４に入力され、クロックが分離される。クロック分離装置及びチャネル分離装置２１３及び２１４は、取り出されたクロックから同期をとり、多重されているデータを分離する。分離されたチャネル上のデータは、選択合成装置２１０を通り、経路選択装置２０７に入力される。

【００８９】選択合成装置２１０は、ハンドオーバに関わるコネクションをハンドオーバメモリテーブル２０６により検索し、該当するコネクションのハンドオーバ実施時に受信データの選択合成を無線フレーム単位で実施し、セルダイバーシチ効果を得ている。詳細については、後述する。

【００９０】経路選択装置２０７は、データが入力されると、当該データを通信する相手の端末が本システムに接続している端末か、それとも外部の通信網１０１を介して接続しなければならない端末なのかを判定する。ここで、当該データが、本システムに接続されている端末宛てであるならば、ここで折り返し、前述したようにマルチキャスト装置２０５に入力する。一方、外部通信網１０１を介して接続しなければならない端末である場合には、タイムスタンプ分離装置２０４においてて本システムのプロトコルを終端し、チャネル多重装置２０２において外部通信網１０１のプロトコルにあわせた変換を行う。

【００９１】（Ｃ－２）基地局の動作

（Ｃ－２－１）下りリンク動作

基地局１０３による下りリンクの動作を説明する。クロック分離装置及びチャネル分離装置３０１は、ＭＣＣ１

０２から送られてきた多重データを入力すると、これをそれぞれのチャネルに分離し、さらに分離したクロックを参照して基地局内部のクロックをクロック同期装置３０４に合わせる。これには位相同期ループ回路（Phase-Locked Loop Circuit、以下「ＰＬＬ回路」という）が用いられる。ＰＬＬ回路の存在により、基地局１０３のクロックは、ＭＣＣ１０２のクロックと比較して伝送による位相遅れが存在するだけで、同一のクロックを有することになり、その結果、同一の時間を計算することが可能となる。

【００９２】クロック分離装置及びチャネル分離装置３０１から出力されたデータは、タイムスタンプ分離装置３０３に入力された後タイムスタンプが分離され、フレーム構成装置及びオフセット補正装置３０６に送られる。ここで、フレーム構成装置及びオフセット補正装置３０６は、当該データを、無線区間で伝送される単位であるフレームに構成する。フレームに構成されたデータは、チャネル符号化装置３０９において、畳み込み符号化及びインターリーブ等の誤り訂正符号化処理される。なお、この誤り訂正符号化処理後のデータは、拡散変調装置３１２において拡散帯域幅まで拡散される。例えば、誤り訂正後のシンボル速度を64［k symbols／s］とすると、これを６４倍に拡散することで、4.096［M chips／s］、すなわち拡散帯域５［MHz］の信号にする。

【００９３】一方、クロック分離装置及びチャネル分離装置３０１において分離されたクロックについては、フレーム周期生成装置３０７に入力されてカウントされ、フレーム周期の計算に用いられる。このパイロット符号化装置３１０における適当な符号化を経ることによりパイロット信号が生成される。このパイロット信号は、拡散変調装置３１３において拡散帯域まで拡散される。前記拡散されたパイロット信号と前記拡散されたユーザ信号は、キャリア変調装置３１５において、他の拡散後のユーザ信号と加算合成され、さらに無線周波数に変調されて、アンテナ装置３１７から放射される。すなわち、セル内に位置する移動局に送信される。

【００９４】（Ｃ－２－２）上りリンク動作

次に、基地局１０３による上りリンク動作を説明する。基地局１０３は、無線伝搬路を介することにより、複数の移動局からの信号をアンテナ装置３１７で受信すると、これをキャリア復調装置３１６に与えて拡散帯域の信号にする。その後、復調された信号をレイク受信装置３１４に与え、フェージングによる位相回転の補正とマルチパス合成とを逆拡散処理と合わせて実行する。これにより、受信された信号は、ベースバンド帯域の信号に復調される。

【００９５】このようにしてベースバンド帯域まで復調された信号には、チャネル復号化装置３１１において、デインターリーブ処理及びビタビ復号等の誤り訂正処理が実行される。さらに、誤り訂正処理終了後のデータは、フレーム分離装置３０８において無線フレームから分解される。これにより、無線インターフェースが終端される。

【００９６】フレーム分解装置３０８の出力データは、タイムスタンプ付加装置３０５に入力され、等データ毎のタイムスタンプの付加がなされる。このように、タイムスタンプを付加する単位をミニフレームと呼ぶ。例えば、32［kbits／s］のデータ伝送時、ミニフレームの単位が１［ms］のときは、４［bytes］のユーザデータ量に対しタイムスタンプが付加されることになる。タイムスタンプが付加されたデータは、チャネル多重装置及びクロック挿入装置３０２によって他チャネルと多重され、さらにクロックが挿入され、ＭＣＣ１０２へと伝送される。

【００９７】（Ｃ－３）移動局の動作

（Ｃ－３－１）下りリンク動作

移動局１０７による下りリンク受信の動作を説明する。無線伝搬路を経てアンテナ装置４０１で受信された拡散信号は、キャリア復調装置４０２に入力され、拡散帯域の信号に復調される。拡散帯域信号は、レイク受信装置４０４において、ベースバンド帯域の信号に逆拡散される。レイク受信器４０４は、移動局の移動に伴い発生したフェージングによる位相回転の補正、及び、無線伝搬路中の建造物等の反射等により生じるマルチパスの合成を行い、受信利得を改善する。

【００９８】レイク受信装置４０４から出力されたベースバンド信号には、チャネル復号化装置４０６においてデインターリーブ及びビタビ復号等の誤り訂正処理が実施される。なお、誤り訂正処理後のデータからは、さらに、フレーム分解装置４０６においてヘッダ等のシンボルが取り除かれ、ユーザデータとして取り出される。このユーザデータは、情報源符号化装置（復号器）４１２において、ユーザの認識し得る状態に変換される。例えば、伝送対象であるデータが音声である場合、当該情報源符号化装置４１２は、G729 や32k-ADPCMなどによって音声符号化されたデータを復号し、音声信号を得る。

【００９９】（Ｃ－３－２）上りリンク動作

次に、移動局１０７による上りリンク送信の動作を説明する。ユーザからの情報は、情報源符号化装置（符号器）４１４においてディジタルデータに変換される。なお、ユーザからディジタル信号が直接入力されるときは、この変換動作は行われない。

【０１００】ディジタル信号は、フレーム構成装置４１１に入力され、無線伝搬路へ送信されるデータ単位に切り分けられる。さらに、このデータには、チャネル符号化装置４０８において、畳み込み符号化及びインターリーブ等の誤り訂正符号化が施され、拡散変調装置４０５により拡散帯域幅まで拡散される。拡散帯域データは、さらに、キャリア変調装置４０３において無線周波数帯にまで変調され、アンテナ装置を経て無線伝搬路中に放

出される。

【０１０１】（Ｄ）ソフトハンドオーバに係る動作

（Ｄ－１）前提となる条件

次に、当該ＣＤＭＡ通信システムにおいて、ソフトハンドオーバを実施するための手順を説明する。

【０１０２】まず、図１に示す配置にある２つの基地局１０３及び１０４と移動局１０７がソフトハンドオーバを実施するために下りリンクにおいて必要なことは、ＭＣＣ１０２にクロック従属している基地局１０３及び１０４それぞれの送信する無線フレーム１０［ms］の位相をあわせること、及び、ＭＣＣＩ０２からそれぞれの基地局１０３及び１０４に伝送される同一の情報が同タイミングの無線フレームに搭載されて送信されることである。しかも、これは低遅延で実施される必要がある。このとき、移動局１０７のレイク受信装置４０４において、最大比合成受信が実現される。

【０１０３】一方、上りリンクにおいて必要なことは、移動局１０７において送信されたフレームを基地局１０３及び１０４それぞれが受信し、巡回冗長検査符号（CyclicRedundancy Check、以下「ＣＲＣ」という）によるフレームの誤り検出を行った後、その結果を１［bit］の信頼度情報として付加すること、及び、ＭＣＣＩ０２においては、この信頼度情報に基づいて選択合成を行わなうことである。

【０１０４】（Ｄ－２）下りリンク動作

下りリンクにおいて実行される一連の動作を図５～図９を用いて説明する。当該下りリンクにおいて実行される動作は、ステップＳＰ１及びＳＰ２において示めされる送信位相を同期させる動作（第１の動作）と、ステップＳＰ３及びＳＰ４において示される通信フレームの切替に係る複数の基地局から送出される伝送フレームに同一のデータを搭載する動作（第２の動作）とに分けることができる。

【０１０５】まず、第１の動作を、図６及び図７を用いて説明する。これら図６及び図７は、基地局１０４がその無線フレームの位相を、基地局１０３の無線フレームに位相をあわせる手順を示すものである。各基地局１０３及び１０４は、それぞれ固有のフレーム周期生成装置３０７を有し、それぞれにおいて生成されたフレーム位相でパイロット信号を拡散変調し送信している。

【０１０６】基地局１０３と移動局１０７間の呼の設定時には、基地局１０３のフレーム周期生成装置３０７の位相にあわせてフレーム構成装置及びオフセット補正装置３０６がユーザ情報のフレームを形成する。図６のように、移動局１０７は、ハンドオーバの実施に係る際、基地局１０３と基地局１０４のパイロット信号の位相差を測定し、通信中の基地局１０３に通知する（ステップＳＰ１）。

【０１０７】これらの動作は、まず、移動局１０７内のレイク受信装置４０４が、拡散帯域信号をパイロット信号の拡散符号で逆拡散を行うことにより得られたベースバンド帯域の信号を、パイロット抽出装置４０７が入力し、ここからパイロット信号を取り出すことから始まる。取り出されたパイロット信号の位相は、フレーム位相測定装置４１０において測定された後、オフセット計算装置４１３に与えられる。このオフセット計算装置４１３は、かかる処理を経て入力された基地局１０３のパイロット信号の位相及び基地局１０４のパイロット信号の位相の測定結果より位相差を計算する。因みに、パイロット抽出装置４０７は、積分回路を用いてフェージングによる高周期の変動を取り除くフィルタで構成されている。また、オフセットは、この後、拡散変調装置４０５における拡散変調チップ単位で測定及び計算される。

【０１０８】このように、切替に係る基地局間に存在するオフセットが基地局１０３に返送されると、次は、ステップＳＰ２の処理に移行する。すなわち、図７に示すように、オフセット情報が基地局１０３及びＭＣＣ１０２を経由して基地局１０４に通知される。ここで、基地局１０４は、自装置内のフレーム構成装置及びオフセット補正装置３０６において受信し、このオフセットだけ送信位相を補正したユーザデータを送信する。以上の処理により、基地局１０３と基地局１０４の無線フレームの位相が一致させられる。

【０１０９】次に、第２の動作を、図８を用いて説明する。この図８は、基地局１０３及び１０４のそれぞれが、無線フレームを構成する方法を説明する図である。なお、図８では、タイムスタンプが付加されている単位、すなわち、１［ms］をミニフレームと呼ぶ。また、この図８では、基地局１０３と１０４に対し、ＭＣＣ１０２より、既に分解されミニフレーム番号が付されたミニフレームが同報されているものとする（ステップＳＰ３）。

【０１１０】さて、図８において、現に通信チャネルを介して通信を行っている基地局１０３は、伝送されて来たデータを１ミニフレーム分だけ遅延させてからフレームを構成するように動作する。すなわち、図８の基地局１０３は、既に自装置に到着しているミニフレーム「５」から次フレームを構成するのではなく、１ミニフレーム前に到着しているミニフレーム「４」からフレームを構成するように動作する。これは、ハンドオーバ先に係る基地局に、すなわち、図８の基地局１０４に同一の情報が届いていることを保証するためである。

【０１１１】このようにミニフレーム「４」からフレームを構成することが決定されると、当該基地局１０３は、フレームの先頭であるミニフレーム番号をＭＣＣ１０２を介して基地局１０４に通知する（ステップＳＰ４）。一方、基地局１０４は、この通知に基づいてフレームを構成し、ハンドオーバの開始時、基地局１０３と同じミニフレーム「４」から開始されるフレームの送信を開始する（ステップＳＰ５）。

【０１１２】かかるオフセット補正とミニフレームシーケンス番号に基づく無線フレームの生成により、移動局１０７のレイク受信装置４０４において、ダイバーシチ受信が実現される。

【０１１３】なお、ここでは説明を省略しているが、通信チャネルの切替タイミング及び切替対象となる基地局は、移動局１０７から基地局１０３に返送される情報を基にＭＣＣ１０２が決定している。すなわち、移動局１０７は、受信状態測定装置により、現在通信に用いている通信チャネルの基地局とほぼ同じ又はそれ以上の受信状態を得られる基地局の存在を常時観察しており、この観察結果を基地局名（コード）とその受信状態を組として（現在、通信中の基地局についての情報も含む）返送しているので、ＭＣＣ１０２がこの情報を基に切替対象となる基地局とその切替タイミングを決定している。

【０１１４】（Ｄ－２）上りリンク動作

最後に、上りリンクにおいて実行される一連の動作を図９を用いて説明する。図９は、ＭＣＣＩ０２の上りリンクに設けられている選択合成手段２１０の動作を概念的に表したものである。

【０１１５】移動局１０７から送信された無線フレームは、基地局１０３及び１０４それぞれにおいて受信された後誤り検出され、再構成されたフレームに１［bit］の信頼度情報の付加を経て、ＭＣＣＩ０２に送信される。これは例えば、ショートセルのヘッダに付加されることで実現される。

【０１１６】ＭＣＣ１０２は、ハンドオーバ実施決定時に移動局１０７から基地局１０３を介するコネクション番号と基地局１０４を介するコネクション番号をハンドオーバメモリテーブル２０６に書き込む。ＭＣＣＩ０２は基地局１０３及び１０４それぞれから多重伝送されてくるデータのコネクション番号を検索し、ハンドオーバに関わるコネクションを検知する。該当する第１のコネクションのデータの信頼度情報をチェックし誤りなしの場合は採用し、誤りありの場合は他方の第２のコネクションのデータが到着するための一定時間を待ち、第２のコネクションのデータの信頼度情報をチェックする。ここで誤りなしの場合には第２のコネクションのデータが採用される。

【０１１７】以上のようにして、ＭＣＣ１０２における信頼度度情報に基づく選択合成が実現される。

【０１１８】（Ｅ）実施形態によるＣＤＭＡ通信システムにより実現される効果

以上のように本実施形態によれば、通信網１０１、ＭＣＣ１０２、基地局１０３～１０５及び移動局１０６～１０８のそれぞれにＧＰＳ受信器を保持せずに構成でき、装置の小型が及び低コスト化を実現できる。

【０１１９】また、ソフトハンドオーバが必ずできるので、従来のシステムでは存在していたソフトハンドオーバの失敗を無くすることができ、音声通信やデータ通信を良好に行うことが可能となる。

【０１２０】さらに、ソフトハンドオーバの状態の移動局の割合が増えることで、適正に行われる送信電力制御において、１基地局当たりに接続可能な移動局数を増大さえることができる。

【０１２１】（Ｆ）他の実施形態

なお、上述の実施形態においては、通信網１０１、ＭＣＣ１０２、基地局１０３～１０５及び移動局１０６～１０８の全てに送信位相の同期を保証する機能を設けて、システムからＧＰＳ受信器を無くす場合について述べたが、かかる同期機能部分については、従来通りＧＰＳ受信器による機能によって保証するようにしても良い。このようにしても、各基地局から送信される送信データの同一性は、前述のタイムスタンプ機能により保証されるので、確実なソフトハンドオーバを行うことができる。

【０１２２】また、上述の実施形態においては、ソフトハンドオーバに係る基地局間において、ソフトハンドオーバ実行時に送信されるフレーム内容の同一性を保証するためその先頭データを通知し合う場合について述べたが、伝送遅延等に起因した同報データの到着時間にずれが生じるおそれが無い場合には、送信データの同一性を保証するための機能を設けない場合にも適用し得る。

【０１２３】

【発明の効果】

(A) 上述のように、第１の発明によれば、通信チャネルの切替に係る複数の基地局装置間に存在する伝送フレーム同期信号の送信位相差を、移動局装置からの通知により補正する処理を含めることにより、各基地局装置が互いに独立したクロックで動作している場合でも、各基地局装置から送出される伝送フレームの位相同期を保証できる通信チャネル切替制御方法を実現することができる。

【０１２４】(B) また、上述のように、第２の発明によれば、次フレーム周期の先頭データに対応する識別符号を、切替に係る基地局装置間で予め通知し合う処理を設けたことにより、フレーム長に比較して短い単位時間間隔による送信タイミングの調整と送信データの同一性の保証が可能な通信チャネル切替制御方法を実現することができる。

【０１２５】(C) さらに、上述のように、第３の発明によれば、第１及び第２の発明の効果を合わせもつ通信チャネル切替制御方法を実現することができる。

【０１２６】(D) さらに、上述のように、第４の発明においては、複数の基地局装置のそれぞれが移動局装置から受信した上り通信データを、その信頼度情報に基づいて選択的に合成する構成としたことにより、ソフトハンドオーバの際に受信された受信データの信頼性を高め、確実なソフトハンドオーバが可能な通信チャネル切替制御方法を実現することができる。

【０１２７】(E) また、上述のように、第５の発明によ

れば、移動局装置から現に通信チャネルを有する基地局装置に通知された位相差情報を、新たな通信チャネルの設定を予定する基地局装置に対して通知する送信位相差通知手段を設けたことにより、両装置がそれぞれ独立したクロックにて動作している場合にも、各基地局装置から送信される通信データの送信位相を一致させることができる移動通信制御局装置を実現できる。

【０１２８】(F) さらに、上述のように、第６の発明によれば、識別符号付加手段と同報手段とを用い、通信データをフレーム長に比較して短い単位時間間隔に分解し、かつ、これに一意の識別符号を付して各基地局装置に同報するようにしたことにより、各基地局装置において生成される伝送フレームの同一性の保証と、遅延時間の短縮とを実現できる移動通信制御局装置を実現できる。

【０１２９】(G) さらに、上述のように、第７の発明によれば、第５及び第６の発明の効果を合わせもつ移動通信制御局装置を実現することができる。

【０１３０】(H) さらに、上述のように、第８の発明によれば、選択合成手段を用い、現に通信チャネルを有する基地局装置から受信された受信データだけでなく、他の基地局装置において受信された受信データも選択的に合成して上りの受信データとすることにより、受信データの信頼性を高め確実なソフトハンドオーバを実現できる移動通信制御局装置を実現できる。

【０１３１】(I) また、上述のように、第９の発明によれば、同期信号送信手段と送信位相差通知手段とを用い、移動局装置から通知を受けた自装置と他の基地局装置との間に存在する同期信号の送信位相差を当該他の基地局装置に通知するようにしたことにより、各基地局装置が互いに独立したクロックで動作している場合でも、各基地局装置から送出される伝送フレームの位相同期を保証できる基地局装置を実現することができる。

【０１３２】(J) また、上述のように、第１０の発明によれば、伝送フレーム位相補正手段を用い、通知された位相差情報に基づいて自装置の送信位相を補正するようにしたことにより、自装置が他の装置と独立したクロックで動作している場合でも、他の装置との間で、伝送フレームの送信位相の同期を保証できる基地局装置を実現できる。

【０１３３】(K) さらに、上述のように、第１１の発明によれば、識別符号通知手段を用い、通信チャネルの切替の際に次フレームにて送出する伝送フレームの先頭データの内容を識別符号として他の基地局装置に通知するようにしたことにより、伝搬遅延のため同一のデータが到着する時刻の同一性が保証し得ないような場合にも、複数の基地局装置から伝送フレームとして送信されるデータの同一性を保証できる基地局装置を実現できる。

【０１３４】(L) さらに、上述のように、第１２の発明によれば、伝送フレーム生成手段を用い、他の基地局装置から通知された識別符号に対応する通信データを先頭データとして伝送フレームを生成し、通信チャネルの切替に係る他の基地局装置から送信される伝送フレームとデータ内容の同一性を保証できるようにしたことにより、確実にソフトハンドオーバを実行できる基地局装置を実現できる。

【０１３５】(M) さらに、上述のように、第１３の発明によれば、第１０、１１及び第１２の発明の効果を合わせもつ基地局装置を実現することができる。

【０１３６】(N) さらに、上述のように、第１４の発明によれば、誤り検出手段と信頼度情報付加手段とを用い、自装置が受信した受信データを処理する移動通信制御装置に対して、自装置が受信した受信データの信頼度を通知するようにしたことにより、上り受信データの信頼性をシステム全体として高めることができる基地局装置を実現できる。

【０１３７】(O) さらに、上述のように、第１５の発明によれば、位相差検出手段と送信位相差通知手段とを用い、通信チャネルの切替に係る基地局装置間に存在する送信位相差を基地局装置側に通知するようにしたことにより、各基地局装置が独立したクロックで動作している場合にも、その送信位相を一致させることができる移動局装置を実現できる。

【０１３８】(P)　さらに、上述のように、第１６の発明によれば、前述の各発明に係る移動通信制御局装置、基地局装置、移動局装置を用いて移動通信システムを構成したことにより、全体として、従来に比して簡易かつ確実にソフトハンドオーバを実現できる移動通信システムを得ることができる。

【図面の簡単な説明】

【図１】実施形態に係るＣＤＭＡ通信システムのシステム構成の概要を示すブロック図である。

【図２】実施形態に係るＭＣＣの構成を示すブロック図である。

【図３】実施形態に係る基地局の構成を示すブロック図である。

【図４】実施形態に係る移動局の構成を示すブロック図である。

【図５】実施形態に係る通信チャネル切替制御手順を示すフローチャートである。

【図６】オフセットの検出とその通知を説明に供する説明図である。

【図７】通知されたオフセットに基づく送信位相の補正の様子を示す説明図である。

【図８】タイムスタンプによる基地局間の送信データ内容の同一性保証の様子を示す説明図である。

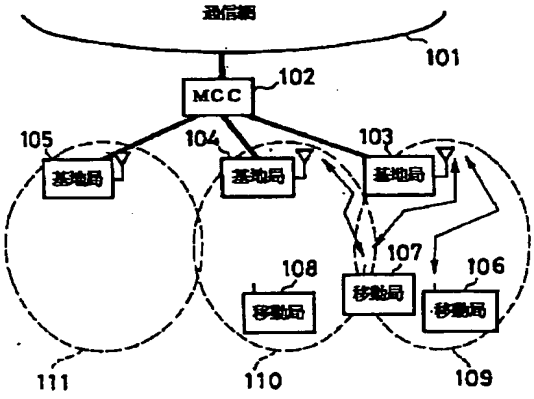
【図９】信頼度情報に基づく上りフレームの選択合成の様子を示す説明図である。

【符号の説明】

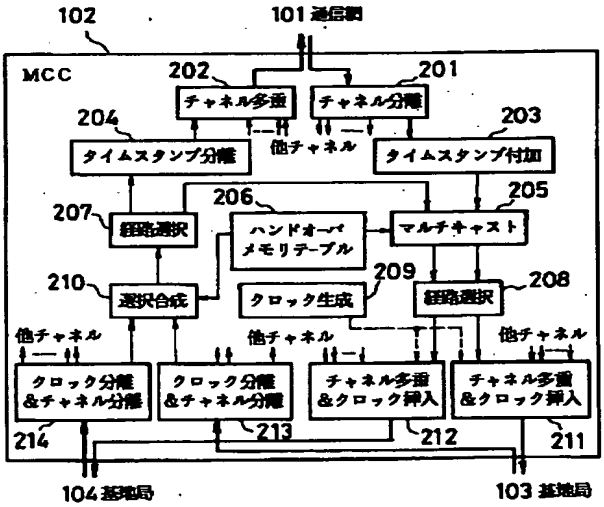
１０１…通信網、１０２…ＭＣＣ（移動通信制御局）、

１０３、１０４、１０５…基地局、１０６、１０７、１０８…移動局、２０３…タイムスタンプ付加装置、２０４…タイムスタンプ分離装置、２０５…マルチキャスト装置、２０６…ハンドオーバメモリテーブル、２１０…選択合成装置、２１１、２１２…チャネル多重装置及びクロック挿入装置、２１３、２１４…クロック分離装置及びチャネル分離装置、３０１…クロック分離装置及びチャネル分離装置、３０２…チャネル多重装置及びクロック挿入装置、３０３…タイムスタンプ分離装置、３０５…タイムスタンプ付加装置、３０６…フレーム構成装置及びオフセット補正装置、３１４…レイク受信装置、４０４…レイク受信装置、４１３…オフセット計算装置、４１５…受信状態測定装置。

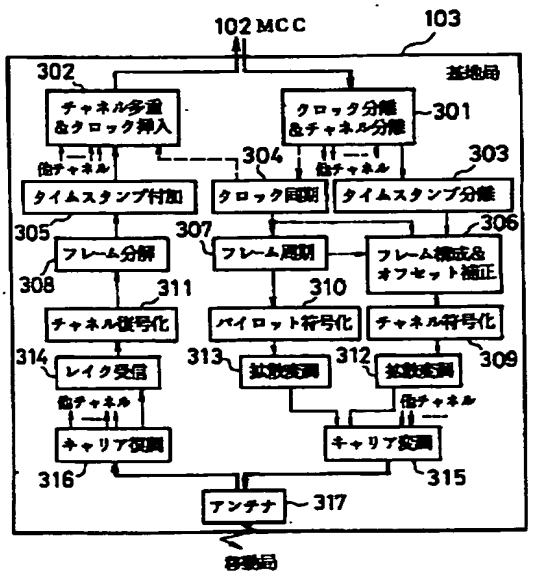
【図１】



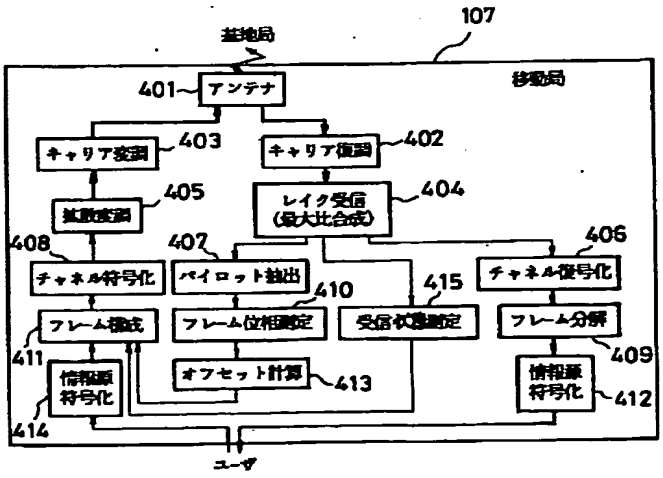

【図２】



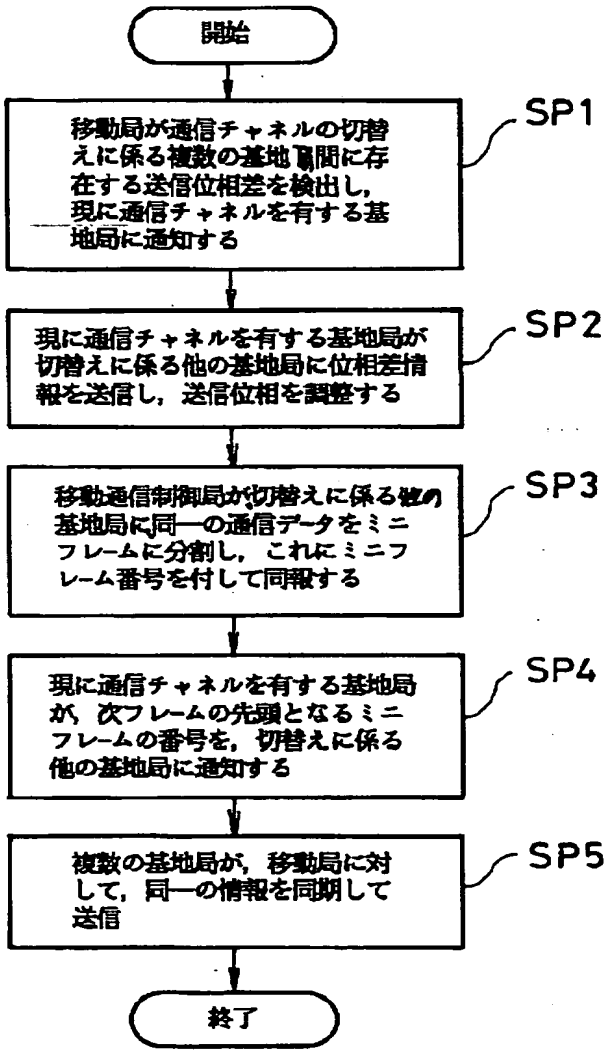

【図３】



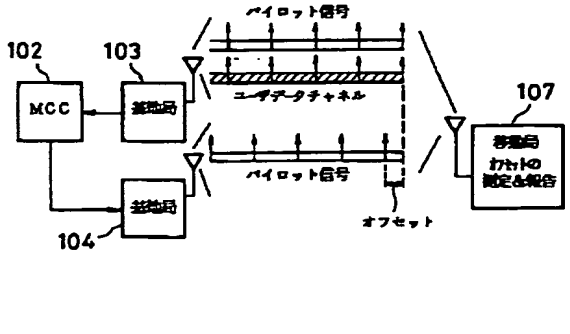

【図４】



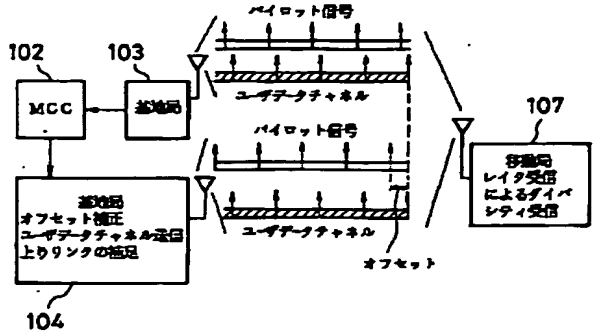
【図５】



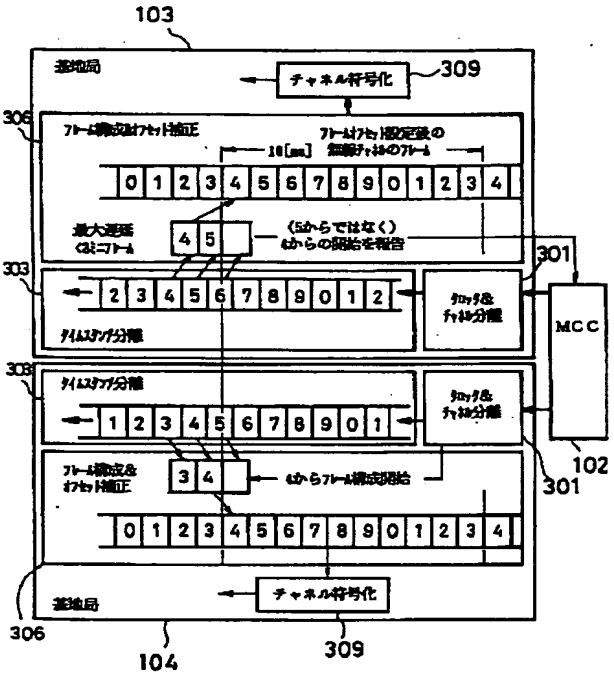

【図６】




【図７】



【図８】




【図９】